UNITED STATES OF AMERICA,
NORTHERN DISTRICT OF ILLINOIS,
EASTERN DIVISION. } ss.

IN THE

District Court of the United States

UNITED STATES OF AMERICA, *Complainant,* vs. THE SANITARY DISTRICT OF CHICAGO, *Defendant,*	C. C. No. 29,019 and Equity No. 114.

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THE GUNTHORP-WARREN PRINTING COMPANY
CHICAGO

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NOTE 2.—Pages 3601 to 3845, inclusive, of Volume VI, contain the following: Extracts from a public hearing on February 28, 1912, in connection with the application of the Sanitary District of Chicago, dated February 5, 1912, for permission to divert 10,000 cu. ft. per second of water through the Chicago and Calumet Rivers; extracts from a public hearing in connection with the same application on March 27, 1912, at which representatives of the Canadian Government and various Canadian cities and interests were heard; extracts from briefs and memoranda submitted; and also certain letters, telegrams, resolutions of protest and of approval from various states, cities, chambers of commerce, associations, and individuals located on the Great Lakes and in the Illinois River Valley.

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575	3, 7, 15	Couteau	Coteau
576	16	Millwright	Mill site
576	31	Case	Amount
578	8	Sewerage	Sewage
589	11	Increment	Increments
598	1	Lopesch	Aux Peche
598	24	Plan	Plane
602	38	Eough	Enough
609	4	Within average	Within an average
609	29	1909	1899
610	29	Gages	Gagings
612	9	Velocity	Discharge
616	29	Junior, Engineer	Junior Engineer
626	39	2.22	2.209
627	27	.79	.78
629	9, 11	Resistancies	Resistances
631	9	Represent	Represents
631	30	28872	28758
631	35	28872	28758
631	35	1617	1610
631	37	1617	1610
631	37	190681	190674
631	41	910	917
632	28	9.06	904
634	7	570.79	570.69
635	30, 31	Made 1896	Made in 1896
638	37	24436	24458
638	38	24436	24458
638	44	27861	28059
639	17	27861	28059
641	7	575,174	575,175
642	5	presented	presents
642	5	table 17 differences	Table 17, differences
642	22	581.56	581.57
642	25	8.71	8.72
643	18	raise	rise
643	44	27861	28059
645	39, 40	** of a foot. By Tables **	..... of a foot, by Tables
647	25	12995	13005
647	31	12995	13005
647	42	divide	divided
648	20	196908	196907
648	32	12995	13005
649	12	12995	13005
649	12	8664	8670
649	14	8664	8670
649	14	27523	27517
650	17	27523	27517
650	34	12995	13005
656	35	24620	24613
657	45	15820	16036
657	2	0.507	0.508
658	3	31203	31370
658	4	14608	14609
658	7	0.507	0.508
658	8	28872	28758
661	34	26	36

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Page	Line	For when	read whence
662	26	11389	11253
662	28	.268	.368
662	32	30948	30579
662	33	five	eight
662	33	10417	10281
663	29	.0368	0.368
663	33	28307	27938
663	34	575	820
663	35	28872	28758
663	45	28872	28758
664	8	40442	40328
664	13	40442	40328
664	18	191023	191614
664	38	197633	198002
664	40	248721	248908
670	4	197633	198002
670	15	98.8	99.0
670	16	0.988	0.99
670	20	0.85	0.855
670	20	29600	29780
670	21	29600	29780
670	31	29600	29780
670	33	27336	26155
672	16	28359	33142
672	37	32060	30460
672	38	240820	240818
680	42	196739	196729
681	4	196739	196729
681	11	199039	199029
681	12	199039	199029
681	14	41781	41791
681	14	41781	41791
681	33	4720	4730
681	35	35.78	35.76
681	38	35.78	35.76
681	43	4720	4730
682	6	14430	14420
682	6	196739	196729
682	14	196739	196729
682	17	10252	10242
682	23	199039	199029
682	24	10252	10242
682	38	9743	9753
682	39	9743	9753
682	7	35793	35803
683	10	correct	corrected
685	19	nearly	over
685	20	an excess	a deficit
689	18	35.06	35.32
689	19	34.13	34.90
689	19	0.93	0.42
689	20	28872	28758
689	40	0.366	0.368
689	42	28872	28758
690	2	30600	30483
690	2	30600	30483
690	3	197633	198002
690	3	11.6	15.4
690	9	34600	35000
690	22		

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690	25	For 34000		read 35000
690	25	.34		.33
690	30	34000		35000
690	30	17000		17850
690	32	30600		30480
690	33	13600		12630
692	15	30332		31918
692	18	0.33		0.31
692	19	0.33		0.31
692	19	0.61		0.63
692	20	0.61		0.63
692	21	30322		31918
692	21	18000		20000
694	26	28872		27938
694	30	28872		27938
694	30	45600		45900
705	23	Huran		Huron
707	2	Seven-eighths percent		Seven-eighths
707	27	197633		198002
707	31	197633		198002
707	31	172500		174000
707	38	25000		24000
707	40	10.4		10.0
708	1	25300		25200
710	27	is		observations
710	28	were		was
710	28	is, were		it was
712	33	28872		27938
712	34	32300		31300
724	13	LXIX-a		LIX-a
724	37	LXIX-c		LIX-c
724	42	LXIX-d		LIX-d
724	44	LXIX-e		LIX-e
725	1	LXIX-f		LIX-f
819	25	136		144.6
819	36	136		144.6
819	37	136		144.6
859	July 20th	1st Column for	0.23	read 0.26
		3rd Column	0.46	read 0.49
	July 25th	2nd Column	0.12	read 0.28
		3rd Column	0.47	read 0.63
860	Aug. 2nd	2nd Column	0.85	read 0.35
		3rd Column	1.17	read 0.67
	Aug. 11th	2nd Column	0.21	read 0.23
		3rd Column	0.44	read 0.45
	Aug. 26th	1st Column	0.58	read 0.60
		3rd Column	1.08	read 1.10
	Aug. 31	3rd Column	0.25	read 0.28
873	Line 40	gravity. The		gravity, the
888	Line 35	1898		1908
889	Line 22	571.96		571.94
889	Line 24	571.96		571.94
889	Line 24	573.26		573.24
898	Line 18	three		two
920	Line 35	1899		1889
963	Line 43	enough		through
968	Line 7	considered		to consider

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PREFACE.

The record in this case contains a number of volumes, consisting of approximately 5,000 printed pages. It was considered advisable and proper, in connection with the presentation of this case, to prepare in condensed form a narrative statement of the pleadings and facts, to which reference could be made by both parties in preparing their respective briefs. Such of the facts as are contained in the record deemed to be material to either party to the suit are included in this statement. The facts bearing upon a particular subject have been drawn together in this statement and collected from different portions of the record, the record page where the matter may be found, being indicated. However, the submission of this statement shall not preclude reference to the record for any matter not contained herein.

IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO, *Appellant,* *vs.* THE UNITED STATES OF AMERICA, *Appellee.*	Appeal from the District Court of the United States, for the Northern District of Illinois, Eastern Division.

APPELLANT'S NARRATIVE STATEMENT OF THE PLEADINGS, FACTS AND EVIDENCE.

There are two suits involved here. One bill of complaint was filed in the Circuit Court of the United States, for the Northern District of Illinois, Eastern Division, March 23, 1908, and involves the diversion of water from Lake Michigan through the Calumet River and the Calumet Sag Channel, an adjunct of the Main Channel of the Sanitary District, and will be called, for convenience, the Calumet Suit. In the second suit the complaint was filed October 6, 1913, in the District Court of the United States, for the Northern District of Illinois, Eastern Division, and involves the diversion of water through the Chicago River and the Main Channel of the Sanitary District, and all other diversion sources, including the Calumet River and Calumet Sag Channel.

PLEADINGS.

The bill of complaint in the Calumet suit, filed March 23, 1908, in the Circuit Court of the United States, for the Northern District of Illinois, alleged and set forth the following (Vol. VIII, pages 1 to 8, inclusive):

The complainant, The United States, was represented by Charles J. Bonaparte, attorney general, and Edwin W. Sims, District Attorney.

First. The Sanitary District is a municipal corporation, organized and existing under an act of the General Assembly of Illinois, approved May 29, 1889, in force July 1, 1889, and entitled: "An Act to create Sanitary Districts and to remove obstructions in the Desplaines and Illinois Rivers." Its principal office is Chicago, Illinois, and it is a citizen thereof.

Second. The Main Calumet River situated in, and flowing, in a northeasterly direction through, the County of Cook, in the said State of Illinois, and emptying into Lake Michigan at South Chicago, in said county, is a navigable river for its entire length from Lake Michigan to where it is formed by the Little and Grand Calumet Rivers. The United States has appropriated and expended large sums of money in improving the navigability of said river, and in improving the harbor at the mouth of the same, that is to say, it has appropriated and expended in such improvement of said river, including its tributaries in Indiana and Illinois, between the years 1884 and 1907, inclusive, the sum of $994,218.98, and in the improvement of said harbor since the year 1870, the sum of $1,567,230. At the present time the largest vessels on Lake Michigan can enter the said harbor and pass up said river for a distance of five miles, and small vessels can ascend the remaining three miles. The Little Calumet River, which, between the mouth of Stoney Creek and the mouth of said river, flows through the said County of Cook in an easterly direction, and in conjunction with the Grand Calumet River in said County, forms the said Calumet River, is also a navig-

able river from its month to the mouth of Stoney Creek in said County. For all of said distance it has a depth of about six feet and steamboats and sailing vessels engaged in interstate commerce use said river. The bridges across said river for said distance, are provided with draws for the accommodation of such craft, and such bridges are under the direct supervision of the Secretary of War of the said United States. The Grand Calumet River, an interstate stream rising in the State of Indiana and flowing in a northwesterly direction into and through the State of Illinois, to the said point of its conjunction with the Little Calumet River, is also a navigable river, and the United States has expended large sums of money in improving its navigability. Lake Michigan and its harbor and connecting rivers and channels, are navigable waters of the said United States. The United States has appropriated and expended large sums of money in improving the navigability of the rivers, channels and harbors connected with said Lake Michigan.

Third. On December 7, 1904, the Board of Trustees of the Sanitary District of Chicago, passed an ordinance, approved by its president, establishing and laying out a route for a channel and outlet of The Sanitary District of Chicago, to be known as the Calumet-Sag Channel. The said ordinance directed that said channel be constructed from a point on the main channel of The Sanitary District at or near Sag, Illinois, about eleven miles in a northerly direction up the said main channel from Lockport, to a point in said Little Calumet River at the mouth of Stoney Creek aforesaid, near the City of Blue Island, connecting the said Little Calumet River with the main channel of The Sanitary District. The said Calumet-Sag Channel was to be of such size, depth and slope that it would have a capacity of 4,000 cubic seconds feet of water, and thereby divert from Lake Michigan through it that amount of water, to the Desplaines, Illinois and Mississippi Rivers, and on to the Gulf of Mexico.

Fourth. On information and belief, it is stated that the diversion and abstraction of the waters of Lake Michigan

into the Mississippi River basin as aforesaid, will lower the level of the water in Lake Michigan, and thus diminish the navigable capacity and depth of the various rivers, channels and harbors connected therewith which have been deepened and improved at great expense under the authority of the Congress of the United States. The construction and maintenance of the Calumet-Sag Channel and the diversion and abstraction of the proposed amount of water from Lake Michigan will have a tendency to undo and annul the orders of Congress as expressed in the various river and harbor acts appropriating funds for improving the harbors and channels connecting with Lake Michigan. The construction and maintenance of said Calumet-Sag Channel as proposed, with its attendant diversion of waters of Lake Michigan, will alter and modify the condition and capacity of all the said harbors and of all the said channels (navigable waters of the United States), and will impede, injure and obstruct navigation in many of said harbors and channels, and will create an obstruction to the navigable capacity of the said mentioned waters of the said United States.

Fifth. For the diversion of said water and the creation of said obstruction to the navigable capacity of said navigable waters of the United States by the defendant, The Sanitary District of Chicago, has not been and is not affirmatively authorized by the Congress of the United States, and has not been and is not authorized in any way by said Congress.

Sixth. The construction and maintenance of the Calumet-Sag Channel as proposed, will lower the levels of the water in the Calumet, the Little Calumet and Grand Calumet Rivers, and will alter and modify the course, condition and capacity of those rivers, respectively.

Seventh. The proposed Calumet-Sag Channel with its attendant diversion, will lower the levels of the waters of Lake Michigan, and will injure and impede navigation in all the harbors and channels in said waters.

Eighth. Section 10 of the Rivers and Harbors Act of March 3, 1899, has remained in force and effect ever since its passage.

Ninth. About November 28, 1906, defendant applied to the Secretary of War for authority to construct and maintain said Calumet-Sag Channel, and to reverse the flow of the Calumet Rivers. Thereupon the Secretary of War requested the Chief of Engineers to make his recommendation concerning the said application. February 23, 1907, the Chief of Engineers reported that he was unwilling to recommend favorably. On March 14, 1907, the Secretary of War denied the application for the said work, and up to the present time the said work has not been recommended by the Chief of Engi neers and has not been authorized by the Secretary of War, and is otherwise without the authority, permission and approval of the said Secretary of War.

Tenth. Defendant, The Sanitary District of Chicago, has announced its intention to construct and maintain said Calumet-Sag Channel, reverse the flow of the Calumet Rivers, and divert water from Lake Michigan. The defendant's board of trustees, on September 18, 1907, adopted and passed an ordinance providing for the construction of said channel, and announcing defendant's intention to construct same, which is marked Exhibit A to the bill of complaint.

(All exhibits to pleadings and documents quoted therein were either offered in evidence or admitted by the pleadings.)

Eleventh. Defendant proposes to divert water from Lake Michigan through the said Calumet Rivers and Calumet-Sag Channel, for sanitary purposes, and for the development of water power. Congress has not fixed any amount of such water for such proposed diversion, and has not provided for same, nor has the Secretary of War, under congressional direction, fixed any amount of such water for such proposed diversion. On the contrary, the Secretary of War has refused to authorize same.

Twelth. Defendant cannot lawfully construct or maintain said Calumet-Sag Channel or reverse the flow of the Calumet Rivers or divert the water from Lake Michigan as proposed.

Thirteenth. October 16, 1907, defendant commenced the excavation of said Calumet-Sag Channel, and defendant intends to and will continue and complete the construction of said channel, reverse the flow of the Calumet River, divert waters from Lake Michigan as proposed, to the irreparable injury of complainant and its interstate navigation and commerce, unless restrained by injunction.

Prayer of bill.

Defendant be restrained and enjoined from beginning or attempting to construct or continuing the construction of, and from doing anything in, towards, or about, the construction of said proposed Calumet-Sag Channel, or diverting or abstracting any waters from Lake Michigan, or from doing or attempting anything in any way to connect the waters of the Calumet Rivers with the main channel of the Sanitary District, from doing or attempting anything in any way to reverse the flow of the Calumet Rivers, and from doing or attempting anything in any way to divert or abstract any waters from Lake Michigan in any channel other than the Chicago River as already authorized by the Secretary of War, unless prior to beginning any of said work or doing or attempting to do any of such things, the Chief of Engineers of the United States shall have recommended, and the Secretary of War of the United States shall have authorized, the doing of such work.

Exhibit A to the bill of complaint.—Ordinance passed by the Board of Trustees of the Sanitary District of Chicago on September 18, 1907.

Whereas, on December 7, 1904, by an ordinance passed by the board and approved by the president, the board established and laid out a route for a channel and outlet of The Sanitary District of Chicago, which channel was by said

ordinance to be constructed and maintained, together with the necessary additions thereto, within the limits of said route;

Whereas, by the terms of said ordinance, it is provided that a channel be constructed by The Sanitary District of Chicago, as described in the bill of complaint;

Whereas, the construction and maintenance of the channel provided for will result in diverting and reversing the flow of the Calumet River, a navigable stream now flowing into Lake Michigan;

Whereas, heretofore, to wit, on November 28, 1906, this board instructed its president to transmit to the Secretary of War an application for a permit to reverse the flow of said Calumet River and thereafter, to wit, on March 14, 1907, the Secretary of War communicated to the board his refusal to issue such permit;

Whereas, this board is advised that it has the right and that it is the duty under the laws of the State of Illinois, to construct said channel, nothwithstanding the refusal of the Secretary of War to issue a permit therefor, for the purpose of furnishing the proper sanitary method of disposing of the sewage of the territory and inhabitants contiguous to the said proposed channel and within the corporate limits of The Sanitary District of Chicago, and unless restrained by a court having jurisdiction of the subject matter at the instance of the United States Government; and

Whereas, the Board of Trustees of the Sanitary District of Chicago deemed the construction of such channel and the reversal of the flow of said Calumet River necessary for the preservation of the health of persons within the limits of the Sanitary District, and that it is in duty bound to proceed with the construction thereof, first giving notice of its intention so to do to the Secretary of War and to the Attorney General, that they may, if they see fit, take such steps as they think proper to protect the rights, if any, of the general government—

Ordered by the Board of Trustees of The Sanitary District of Chicago, as follows:

First. Finance committee to arrange for the purchase of right of way.

Second. Chief Engineer to prepare plans and specifications for the construction of said channel according to the terms of the ordinance adopted by the board December 7, 1904.

Third. The clerk of the district is directed to transmit a certified copy to the Secretary of War, Attorney General, Chief of Engineers, and District Engineer in charge at Chicago.

Answer of the Sanitary District of Chicago to the bill of complaint filed March 23, 1908, as follows: (Vol. VIII, pages 9 to 28.)

First. Admits it is a municipal corporation, as alleged in the bill of complaint. Map is attached as Exhibit A to the answer, showing the territorial limits of The Sanitary District of Chicago, comprising 358 square miles, located within which there are a number of cities, towns and villages, including Chicago.

Second. Admits the allegations of the bill of complaint as to the location of the Calumet River, but denies that it is a navigable river, and that it is traversed by vessels engaged in commerce; admits the allegations of Paragraph 2 of the bill of complaint as to the amount of moneys appropriated and expended by the Federal Government in the improvement of said river, but denies that the Calumet River, from its mouth to the conjunction with Stoney Creek, is a navigable river, and that it is traversed by the vessels engaged in interstate or intrastate commerce; that the Grand Calumet River from its origin in the State of Indiana to its confluence with the Little Calumet River, is a navigable river.

Third. Admits the passage of the ordinance of December 7, 1904, laying out the said Calumet-Sag Channel; a copy of said ordinance is attached, marked Exhibit G.

Avers that on January 22, 1908, the Board of Trustees of defendant passed another ordinance extending the right of way, laid out by ordinance of December 7, 1904, in an easterly direction to a point known as "Forks," as shown on Exhibit F attached; copy of said ordinance is attached as Exhibit H.

Denies that the construction of said channel as proposed will result in diverting and abstracting from Lake Michigan, 4,000 cubic feet of water per second.

Fourth. Denies that the diversion and abstraction of waters from Lake Michigan contemplated through the Calumet-Sag Channel, will lower the level of the water of the Great Lakes, and will diminish the navigable capacity of said waters or the harbors thereof.

Denies that interstate or any other commerce will be injured or interfered with by said diversion, or by the maintenance of said Calumet-Sag Channel; that the construction of said channel will have a tendancy to undo orders of Congress; that the construction of said channel will alter and modify the conditions of the rivers and harbors of the United States, or any of them, and substanially and seriously impede, injure and obstruct navigation of the Great Lakes. Avers that construction and maintenance of said waterway and channel, with its attendant diversions, will not in any wise affect the navigable capacity of the Great Lakes or the harbors and channels connected therewith, or the rivers flowing into same, and will not injure commerce; that the said channel and its operation and maintenance will be to the interest of interstate commerce.

Fifth. Denies the allegation to the effect that the said construction of the said Calumet-Sag Channel had not been affirmatively authorized by Congress. Avers that it has been expressly authorized.

Sixth. Denies that the construction and maintenance of said channel will lower the level of the Little Calumet River.

Seventh. Admits that the bodies of water mentioned in paragraph 7 of the bill of complaint, are each connected with the other, and are in a measure inter-dependent upon each other for the respective water levels. Denies that the said proposed channel would lower the levels of all of said waters, or any of them, or that it would injure or impede navigation in such harbors and channels.

Eighth. Admits Section 10 of the Rivers and Harbors Act of March 3, 1899, has been and is in full force and effect. Denies that said act has any binding force on the defendant, or prohibits the construction and maintenance of said channel, or that the same is a constitutional or valid enactment.

Ninth. Admits application November 28, 1906, to the Secretary of War for permit to reverse the flow of the Calumet River; denies that by making said application, it admitted the jurisdiction of the Secretary of War in such matters, that it required such permit. Avers that it made such application as a matter of comity and in order to promote and maintain the spirit of harmony which it believes should obtain between the Federal Government and the various state and local governments; all of which is shown by statement filed with the Secretary of War at the time of making said application—

> "That while insisting upon the right as a matter of right, we are entitled, nevertheless, to a permit from the Secretary of War; to evidence that there exists between the two governments that 'spirit of harmony and conciliation' which, in the words of Chief Justice Marshall, in *Gibbons* v. *Ogden* (9 Wheaton, 1), 'ought always to characterize the conduct of governments standing in the relation which that of the Union and those of the states bear to each other'; and to further evidence on the part of said governments that 'frank and candid cooperation for the general good' spoken of by Justice Johnson in the same case, ' which should always take place where there is a seeming blending of the power of the two governments and an apparent conflict'!"

Tenth. Admits that defendant has announced its intention to proceed to construct said Calumet-Sag Channel.

Eleventh. Admits Section 1 of Act of Congress approved June 29, 1906.

Twelfth. Denies the allegation of the bill of complaint to the effect that Congress has not provided for the diversion of any of the waters of Lake Michigan through said channel. Avers that the defendant and the State of Illinois are expressly authorized by congressional legislation to construct and maintain a waterway such as is proposed by the defendant and to divert the waters of Lake Michigan through the same into the Illinois River.

Thirteenth. Denies that defendant cannot lawfully construct and maintain said proposed channel. Avers that it is lawfully empowered to do so and that it is the duty under the laws of the United States and of Illinois.

Fourteenth. Admits that on October 16, 1907, it began work on said channel; that it proposes to construct the same in the manner and form and of the character, size and dimensions as hereinafter set forth. Denies that the construction and maintenance thereof would be to the manifest or irreparable injury of the United States or to interstate and foreign commerce. Avers that the waterway will benefit both state and interstate commerce.

Fifteenth. Avers that in 1822 and 1827 Congress enacted laws authorizing Illinois to construct a waterway suitable for navigation, connecting the waters of Lake Michigan with those of the Illinois River, and to thereafter maintain the same at all times in a condition suitable for navigation, as will more fully appear from the said acts, to which reference is made; that after the passage of said acts, the State accepted same and thereafter, by various acts duly passed by the General Assembly of Illinois, approved by the Governor, the State authorized the construction of and did construct and has ever since maintained, a waterway connecting the waters of Lake

Michigan with those of Illinois River over and through which waterway commerce has been carried on continuously since the date of the completion thereof in, to wit, 1848. Defendant refers to each and all of the several acts of Illinois legislature relating to said waterway. Avers that the waterway as originally constructed, connected the waters of Lake Michigan with those of the Illinois River by a channel terminating at or near the City of Peru, on the Illinois River, in the County of LaSalle, Illinois, and beginning at a point on the Chicago River which in turn connected with Lake Michigan, in the City of Chicago, and also by a branch terminating at or near the mouth of Stony Creek on the Calumet River, which said channel and which said branch connecting with said Calumet River, are represented and shown, by lines colored yellow, on the map or plat which is hereto attached, marked Exhibit E.

Sixteenth. Avers that the defendant, in compliance with and pursuant to the powers and duties resting upon it, constructed a channel of the character, size and dimensions provided for by the original act of its incorporation, extending from a point on the Chicago River in the City of Chicago near the original termination of the Illinois and Michigan Canal, parallel with said Illinois and Michigan Canal, to and through the City of Joliet, as shown upon Exhibit E to the answer; that the construction of said channel was begun in the year 1892; that said channel was completed from its said connection with the Chicago River to a point at or near Lockport, a distance of three or four miles northeasterly from the City of Joliet, in the year 1900, sufficiently to turn the waters therein for the purpose for which said canal had been constructed; that in the year 1900, pursuant to various laws of the State and of the United States, defendant did divert waters of said Chicago River and Lake Michigan to and into said waterway and discharged the same into the Desplaines and thence into the Illinois River; that since the turning in of said waters defendant has prosecuted the work of extending said canal through the City of Joliet, and has likewise

continued the work of deepening and widening the Chicago River with which it connects, for the purpose of making said waterway sufficient to accomplish the objects of its creation, both as an outlet for the sewage of The Sanitary District and for the purpose of commerce and navigation; that said waterway or channel has been substanially completed from the Chicago River to the City of Joliet, a distance of thirty-two miles; that at Lockport there is a lock 130 feet long and 22 feet wide and 12 feet over-mitre sills; that alongside this lock, there is a reservation for a lock of ample capacity to accommodate the largest lake-going vessels; that upon the construction of the large lock, the largest lake-going vessels will be able to pass through this channel from Lake Michigan to the City of Joliet; that defendant has expended in the construction and operation of said waterway to September 1, 1907, $54,500,000, which sum, added to that spent by the State of Illinois on the Illinois and Michigan Canal, equals $61,037,254.79.

Seventeenth. Avers that after the turning in of the water into said waterway already constructed by defendant, the City of Chicago, lying wholly within the confines of the territorial limits of the defendant, has so reconstructed and built its sewage system, by a system of intercepting sewers and trunk sewers, as to carry the sewage of that portion of said city north of Eighty-seventh street and south of Fullerton avenue into said channel, thus preventing the discharge thereof into Lake Michigan as it theretofore existed. That thereby the city has prevented the pollution of Lake Michigan and partially protected the water supply of said city procured from the lake through water tunnels and intakes. That the location of the intakes is indicated upon Exhibits A and D to the answer. That the territory of the City of Chicago discharging into the defendant's channel and waterway, is represented upon Exhibit B: That the City of Chicago has constructed a trunk sewer or conduit from a point near the intersection of the shore line of the lake with Thirty-ninth street westward to the south fork of the south branch through which

said trunk sewer or conduit water from Lake Michigan is pumped, and it has a maximum capacity of 120,000 cubic feet per minute.

Eighteenth. Avers that the sewage from that portion of defendant's territory lying south of Eighty-seventh street, still discharges into Lake Michigan either directly or through the Calumet River, and pollutes the waters of the lake, and is a constant menace to the people as it contaminates the water in proximity to and around and about the Hyde Park or Sixty-eighth street intake, through which a large portion of the water supply of the inhabitants of the city passes, and through which other muicipalities within the defendant's limits obtain their water. That the water mains of the City of Chicago are so interdependent that the water entering any of same may find its way into any and all portions of said city, and that the pollution of any one of the intakes of said city does or may pollute the water supply of said entire city and in this manner menaces and threatens the health and welfare of all of the people of said community; that there is being discharged into said Lake Michigan the sewage of substantially 200,000 people residing south of Eighty-seventh street.

Nineteenth. Avers that waterway and channel sought to be enjoined is for the purpose of protecting the water supply of inhabitants south of Eighty-seventh street, and in compliance with the duty prescribed by the several laws of Illinois; that when completed, it will be located as represented and shown on Exhibits B and C, substantially twenty-one miles in length from the eastern shore line of Lake Calumet to the connection thereof with the main channel at Sag, Illinois. That from Lake Calumet, the channel will extend along the little Calumet River to Blue Island; thence sixteen miles to Sag, Illinois. That the Calumet River will be dredged to a depth of twelve feet, with a bottom width of seventy-two feet and water line width of 160 feet; that the channel itself will have a width in the glacial section of seventy-two feet

and 162 feet at the water surface, with a depth of twenty-two feet; in the rock sections ninety-three feet with vertical sides and depth of twenty-two feet.

Twentieth. Avers that defendant proposes to flow westwardly through said channels, water sufficient to reverse the flow of the Calumet River in order to carry the sewage discharging therein away from Lake Michigan; that the quantity of water so diverted would only be sufficient to cause a reversal of said flow and to properly dilute the sewage so as to comply with the several laws under which the defendant is incorporated, not exceeding at any time 4,000 cubic feet per second; that the maximum amount of water that can be flowed through the main channel of the defendant westwardly from the confluence of the Calumet-Sag Channel with it, is 840,000 cubic feet per minute; that the amount of water the defendant will flow through said channel from time to time, will only be such amount as is required by law for the proper dilution of sewage of the district; that by the construction and maintenance of the proposed Calumet-Sag Channel, it is not proposed to flow any more water than sufficient to meet the requirements of law for sewage dilution, which amount it would be bound by law to flow through its main channel without the construction of the Calumet-Sag Channel complained of.

Twenty-first. Denies that the construction and maintenance of the proposed channel will in any wise affect the levels of the Great Lakes and their connecting waters, or that it will injure or be a detriment to commerce thereon, or that it will affect the navigable capacity of the Little Calumet or Grand Calumet Rivers. Avers that it will not in any wise affect, alter, modify or change the Little Calumet River other than as herein specifically set forth, which is to the benefit of said river and commerce thereon.

Twenty-second. Avers that Exhibit F attached, shows in detail the dimensions of the Calumet and Little Calumet Rivers from Lake Michigan to Stony Creek; that the Calumet River to the eastern terminus of defendant's Calumet-Sag Channel, has a depth twenty-two, twenty-one and seven-

teen feet; that from the easterly terminus of defendant's proposed channel along and in the Calumet River, the present depths of the river are from eight to four feet, and it is correspondingly narrow.

Twenty-third. Avers that upon the completion of the Calumet-Sag Channel as proposed, it will afford navigation for vessels of the Great Lakes through the Calumet River to its main channel, and from thence to the City of Joliet, and will be a sufficient and valuable route for commerce, and will be for the benefit of commerce on the Great Lakes, Desplaines, Illinois and Mississippi Rivers; that all the water proposed to be diverted through its main channel and the Calumet-Sag Channel, will be discharged into the Desplaines River, and from thence into the Illinois River, and will form, through and by said rivers, a navigable channel from Lake Michigan to the Mississippi River; that the construction and maintenance of said Calumet-Sag Channel and said main channel through and by the authority of the State, is in accordance with the declared and express public policy of the United States and the State of Illinois to forever maintain a waterway suitable for navigation connecting the waters of Lake Michigan with the waters of the Illinois and Mississippi Rivers.

Twenty-fourth. Avers that defendant is the only body or municipality clothed with authority to provide for the drainage and disposal of sewage in furnishing the outlets therefor within its corporate limits; that by reason of the laws of Illinois, it is proceeding to dispose of and provide a means for disposal of, by a channel and adjuncts thereto, of all the sewage arising within its corporate limits which would otherwise flow into Lake Michigan, polluting the water supply of the inhabitants of defendant; that there is no other lawful method provided of disposing of the sewage and drainage of said territory, than by the construction of channels and adjuncts thereto, and that said proposed Calumet-Sag Channel is part of the only plan provided for the disposal of sewage and the furnishing of outlets therefor.

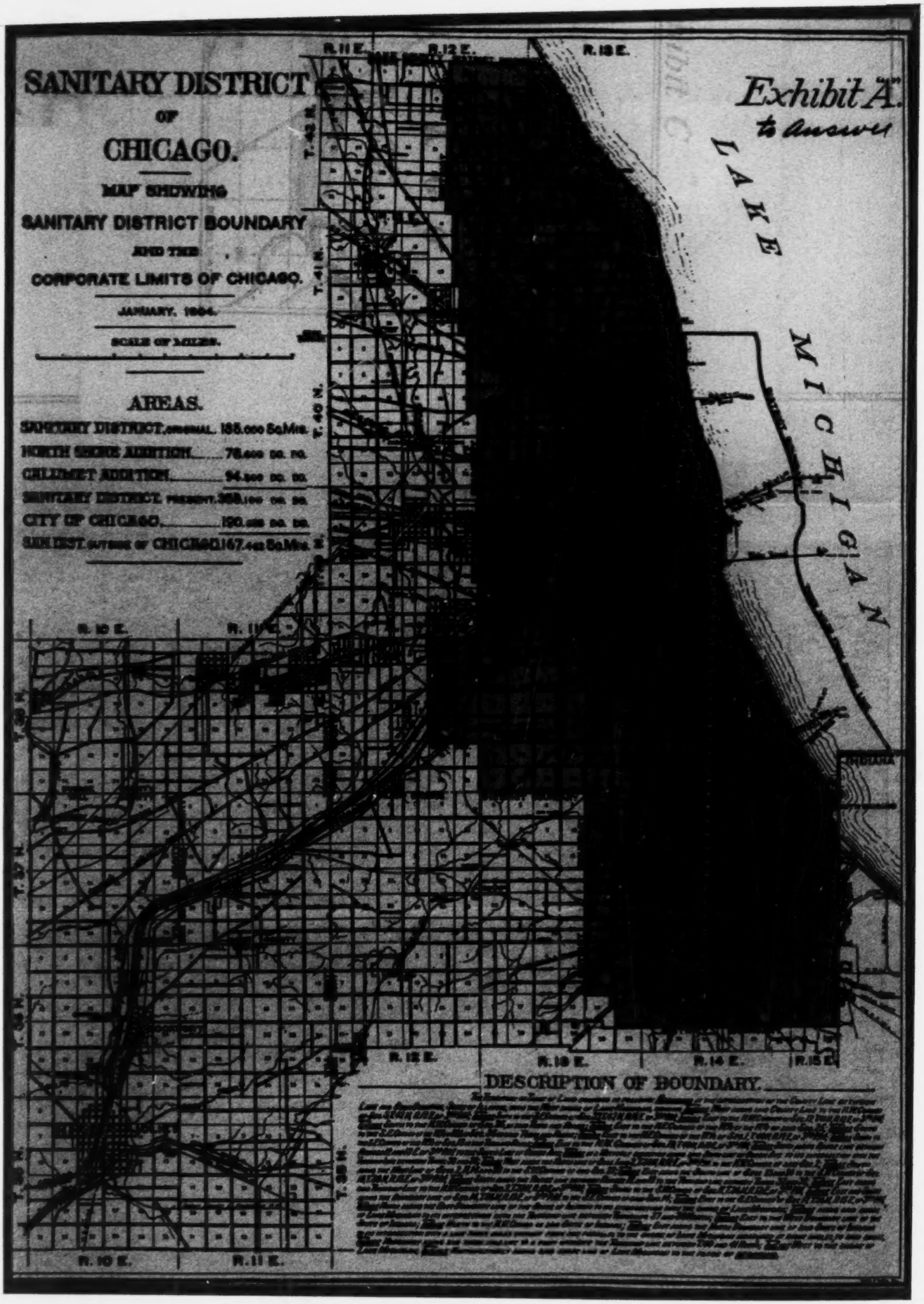
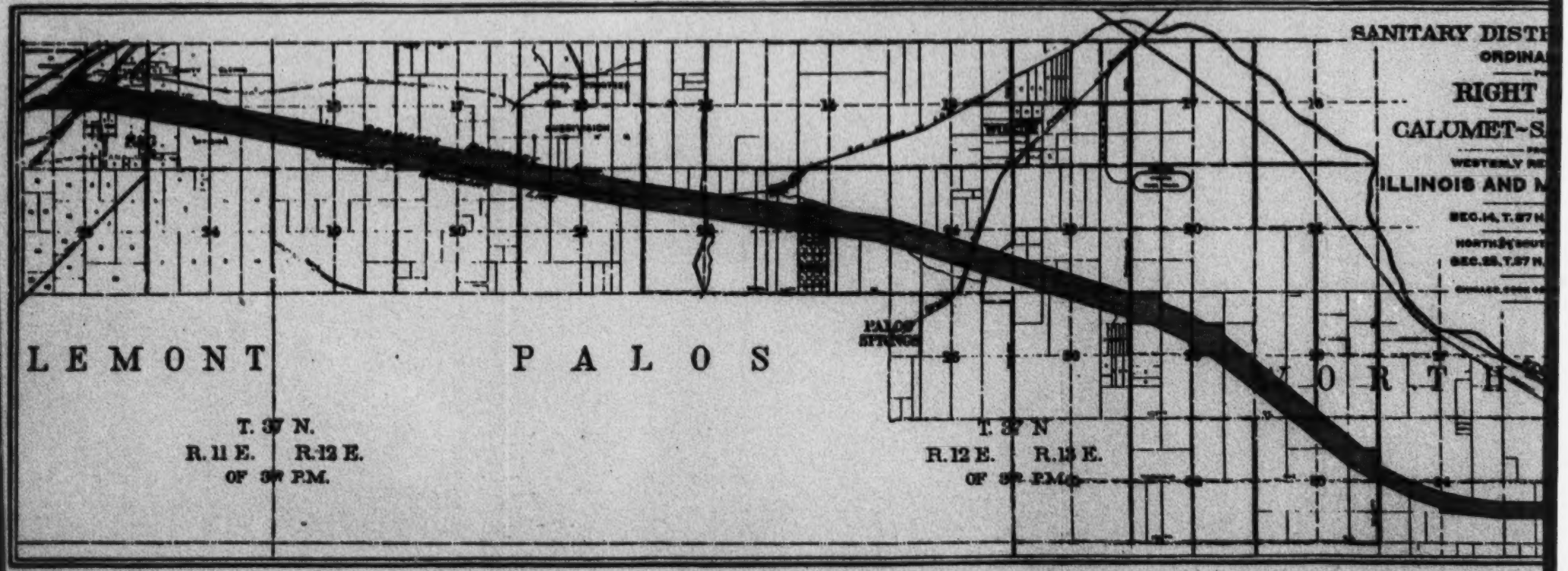

SANITARY DISTRICT
OF
CHICAGO.
MAP SHEWING
SANITARY DISTRICT BOUNDARY
AND THE
CORPORATE LIMITS OF CHICAGO.
JANUARY, 1904.
SCALE OF MILES.
AREAS.
SANITARY DISTRICT, original. 185.000 Sq.Mls.
NORTH SHORE ADDITION. 76.000 Sq. Mls.
CALUMET ADDITION. 94.000 Sq. Mls.
SANITARY DISTRICT, PRESENT. 355.100 Sq. Mls.
CITY OF CHICAGO. 190.000 Sq. Mls.
SANITARY DISTRICT OUTSIDE OF CHICAGO 167.442 Sq.Mls.
Exhibit A.
to Answer
LAKE MICHIGAN
R. 11 E.
R. 12 E.
R. 13 E.
R. 10 E.
R. 14 E.
R. 15 E.
T. 42 N.
T. 41 N.
T. 40 N.
T. 39 N.
T. 38 N.
INDIANA
DESCRIPTION OF BOUNDARY.

Exhibit B to Answer



B to Answer

Exhibit C

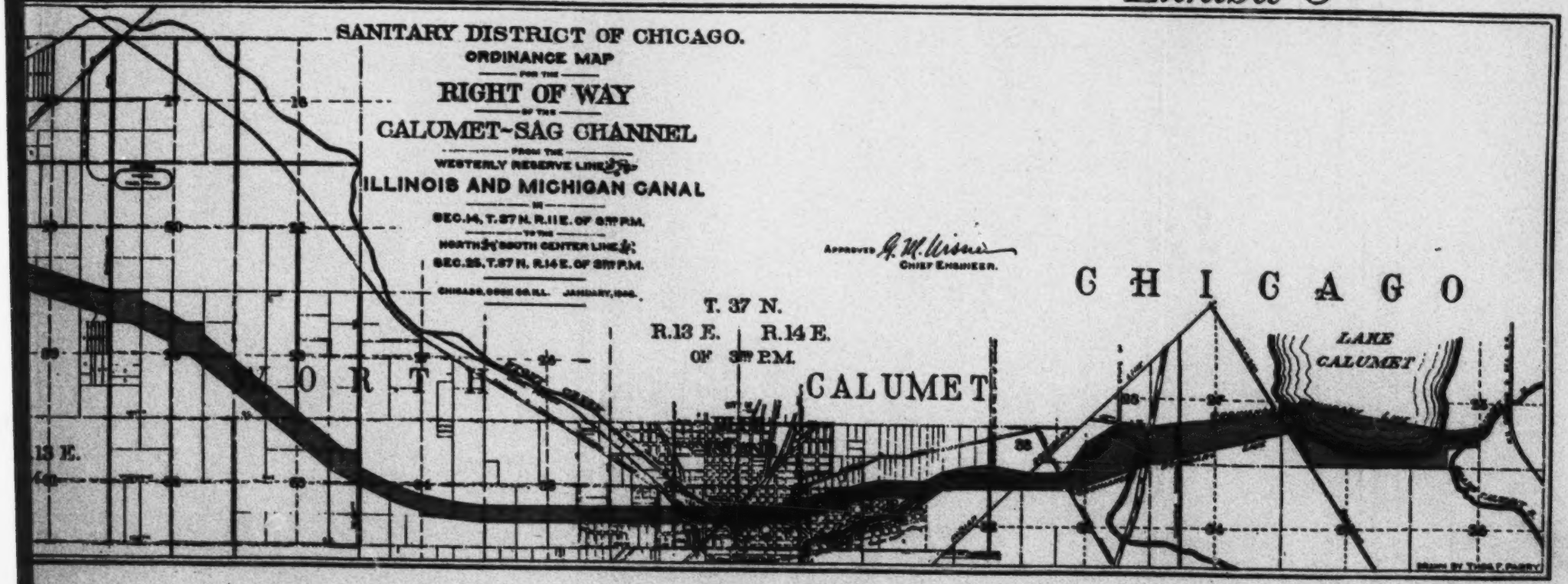
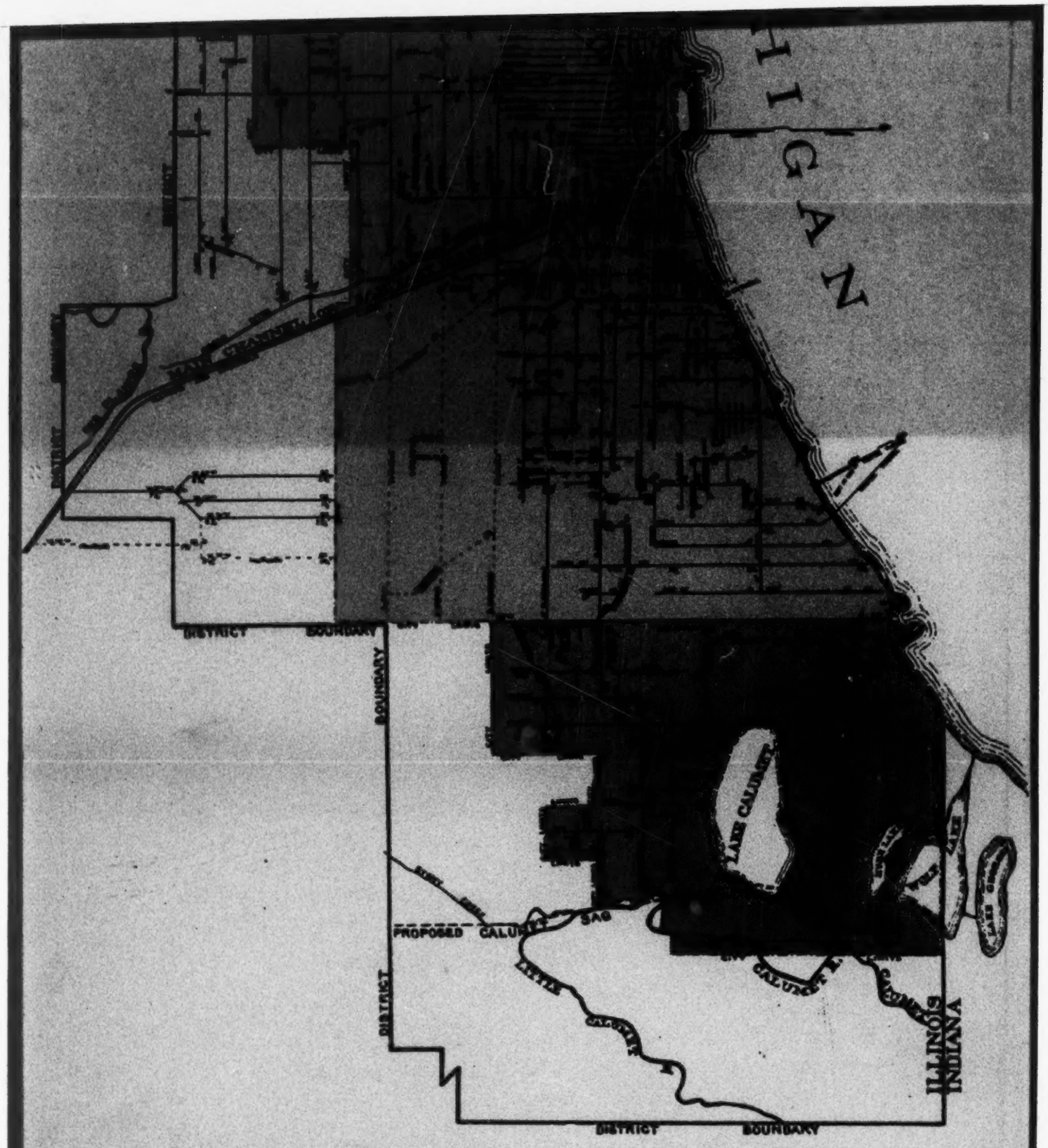


Exhibit "D"
To Answer
LAKE
MICHIGAN
CHANNEL
DISTRICT
BOUNDARY
DISTRICT
BOUNDARY
DISTRICT
BOUNDARY
LAKE
BRANCH
WEST BRANCH



SANITARY DISTRICT OF CHICAGO

MAP OF THE

CITY OF CHICAGO AND VICINITY

SHOWING

MAIN OUTFALL SEWERS.

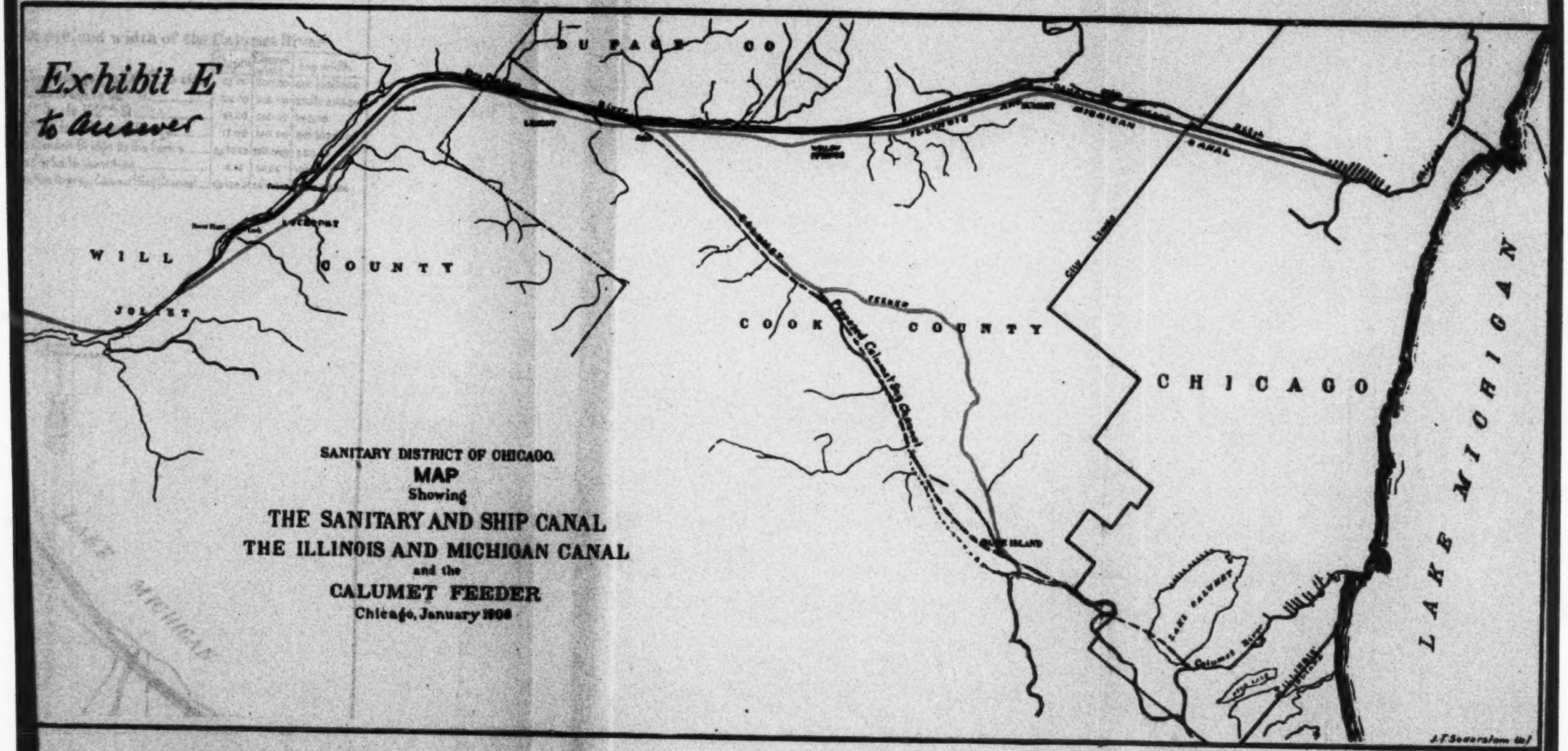
CHICAGO JAN. 23, 1908.

SCALE IN STATUTE MILES.

Territory draining into the Sanitary District Channel colored thus

Calumet River " "

Exhibit E
to Answer



SANITARY DISTRICT OF CHICAGO

MAP
CALUMET RIVER
from
LAKE MICHIGAN TO JUNCTION
with
PROPOSED CALUMET SAG CHANNEL

Scale ½ Mile = 1 Inch Chicago, Dec. 1907

EXHIBIT F.

to Answer

Depth and width of the Calumet River

	Depth	Channel width	Top width
from Lake Michigan to 106th St. Bridge	21.00	200.00	220 to 400
" 106th St. Bridge to 110th St.	20.00	200.00	220 to 400.00
" 110th St. to 122nd St.	21.00	200.00	400.00
" 122nd St. to Chiffendon Bridge	17.00	200.00	220 to 400
" Chiffendon Bridge to the Forks	21.00	21.00	200.00
" the Forks to Junction	9.00	21.00	100.00
" Junction to prop. Calumet Sag Channel	21 to 9	21 to 9	200 to 400

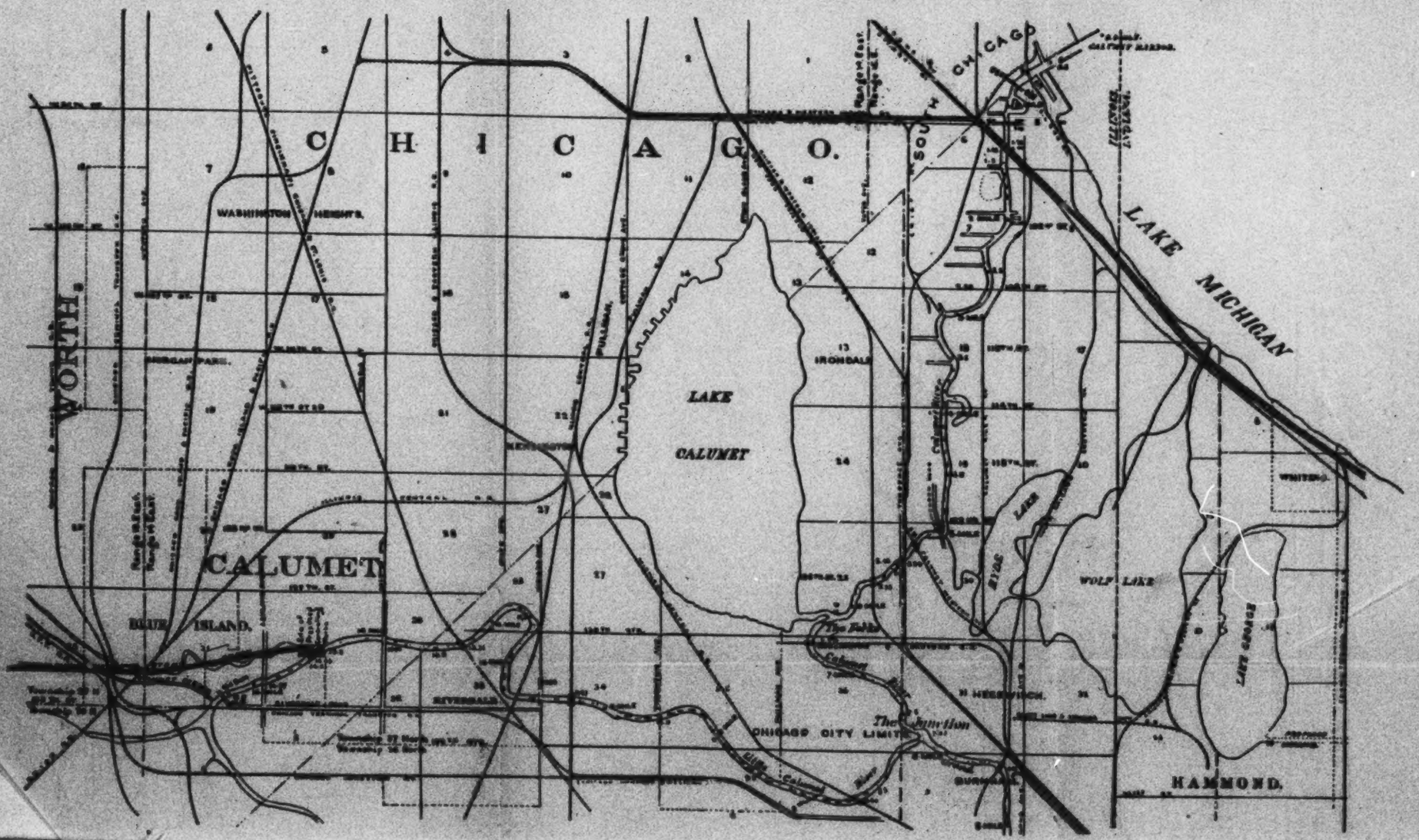


Exhibit G to answer, being an ordinance adopted December 7, 1904, by the Board of Trustees of the Sanitary District, laying out and adopting the project of the Calumet-Sag Channel. (Vol. VIII, Pages 19 to 26.)

The ordinance lays out the route of the Calumet-Sag Channel, describes by legal description the properties through and over which it passes, locates the center line as extending from the main channel of the Sanitary District near Sag, Illinois, easterly to a point at Stony Creek, near Blue Island, Illinois. (Exhibits A, C, D, E, F, page opposite.)

Exhibit H to answer, being ordinance passed January 22, 1908, supplementary to the ordinance of December 7, 1904, extending the right of way of the Calumet-Sag Channel easterly through Blue Island, to a point on the Little Calumet River. (Vol. VIII, Pages 26-28.)

Complaint in Main Channel suit, filed October 6, 1913. (Vol. VIII, pp. 39-58.)

The United States was represented by James G. McReynolds, Attorney General, and James H. Wilkerson, United States District Attorney for the Northern District of Illinois, against the Sanitary District of Chicago, and the complaint alleges the following:

First. Defendant, the Sanitary District of Chicago, is a municipal corporation, organized under an act of the General Assembly, approved May 29, 1889, in force July 1, 1889, and entitled: "An Act to create Sanitary Districts and to remove obstructions in the Desplaines and Illinois Rivers." Its principal place of business is Chicago, Illinois, and it is a citizen of said state.

Second. The Chicago River is situated in Cook County, Illinois, and consists of a main river, originally flowing in a generally easterly direction emptying into Lake Michigan. The said river was formed by two branches known as the

north and south branches, the south branch being divided into two forks, known as the west fork and the south fork.

Third. The Chicago River, including the north and south branches, west and south fork of the south branch, is a navigable water of the United States.

Fourth. The United States has appropriated and expended $4,216,066.36 in improving the said river and harbor at the mouth of the same.

Fifth. Section 10 of the act of Congress approved March 3, 1899, known as the Rivers and Harbors Act of that year has remained in full force and effect ever since its passage.

Sixth. Prior to May 8, 1899, the Sanitary District applied to the Secretary of War for permission to reverse the current and flow of the Chicago River and divert and abstract a quantity of water from Lake Michigan through said Chicago River and through a certain canal which was constructed by defendant. On May 8, 1899, the Secretary of War issued a permit to the defendant to reverse the current and flow of said river and to divert and abstract from Lake Michigan, not to exceed 300,000 cubic feet per minute, reserving the right to make changes as the Secretary of War should see fit in the interests of navigation and property rights. Copy of said permit is attached as "Exhibit A."

Seventh. April 9, 1901, the Secretary of War ordered defendant to reduce the flow through the Chicago River to 200,000 cubic feet per minute. Copy of the order is attached as "Exhibit B."

Eighth. Thereafter, the Secretary of War, pursuant to application of the Sanitary District of July 23, 1901, modified the preceding permit and order, and issued a permit to defendant to flow 300,000 cubic feet of water per minute, between the hours of 4:00 P. M. and 12:00 P. M. midnight, copy of which order or permit is attached as "Exhibit C."

Ninth. Subsequently, pursuant to application of the Sanitary District, on the 5th of December, 1901, the Secretary of War issued a permit to flow 250,000 cubic feet per minute throughout the twenty-four hours of the day, copy of which is attached as "Exhibit D."

Tenth. Thereafter, on the 17th day of January, 1903, a permit was issued to the Sanitary District to increase the flow to 350,000 cubic feet per minute until March 30, 1903, after which date the flow was to be reduced to 250,000 cubic feet per minute, as theretofore, copy of which is marked "Exhibit E" and attached.

Eleventh. On November 28, 1906, defendant made application to the Secretary of War for permission to construct a canal connecting the Calumet River with the main channel of the Sanitary District Canal at what is known as Sag, Illinois, and to reverse the flow of the Calumet River, which application was refused March 14, 1907, by the Secretary of War.

Twelfth. On the 11th of September, 1907, permit was granted pursuant to application of the Sanitary District to construct a canal connecting Lake Michigan at Wilmette, Illinois, with the north branch of the Chicago River, upon condition that the total diversion of water from Lake Michigan through the Chicago River should not exceed the amount already authorized by the War Department, to wit, 250,000 cubic feet per minute.

Thirteenth. Subsequently, pursuant to application of the Sanitary District of June 27, 1910, a permit was granted by the Secretary of War, authorizing defendant to construct a canal connecting the Calumet River with the main channel of the Drainage Canal at Sag, Illinois, and to divert and abstract water from Lake Michigan through said canal, providing, among other things, that the amount of water withdraw from Lake Michigan through the Chicago River should not exceed the total amount of 250,000 cubic feet per minute, the amount previously authorized to de withdrawn.

Fourteenth. February 5, 1912, defendant applied to the Secretary of War for permission to withdraw and divert from Lake Michigan, through the Chicago River and Calumet River, not to exceed 10,000 cubic feet of water per second. Copy of the application is attached as "Exhibit F."

Fifteenth. January 8, 1913, the Secretary of War refused the application of February 5, 1912, copy of which refusal is attached as "Exhibit G."

Sixteenth. Defendant has for a long period of time abstracted water from Lake Michigan, caused it to flow through the Chicago River, and is at present diverting through said river, from 400,000 to 600,000 cubic feet per minute, which amount is greatly in excess of the amount permitted by the Secretary of War, and is in violation of the permits of said Secretary of War, which limit the flow to 250,000 cubic feet per minute. Defendant intends and threatens to continue.

Seventeenth. Congress has not authorized the diversion through the Chicago River, and the Chief of Engineers has not recommended in excess of 250,000 cubic feet per minute.

Eighteenth. Diversion and abstraction of water in excess of 250,000 cubic feet per minute, has lowered and will continue to lower the level of the water of Lakes Michigan, Huron, St. Clair, Erie, Ontario, and the Rivers Sault Ste. Marie, St. Mary's, St. Clair, Detroit, Niagara, St. Lawrence, and all the harbors, canals, channels and rivers connected therewith, all being navigable waters of the United States, and will thus injure and diminish and create obstructions to the navigable capacity of all said waters.

Nineteenth. Said waters have been deepened and improved at great expense under congressional authority. The diversion and abstraction of waters from Lake Michigan in excess of the permits hereinabove set forth, will have a tendency to undo and annul the orders of Congress as expressed in the various Rivers and Harbors acts appropriating funds for im-

proving harbors and channels in the above named waters and channels connected therewith.

Twentieth. The diversion of waters of Lake Michigan through the Chicago River, in excess of the permits, will alter and modify the condition and capacity of the channel of the said Chicago River, which is a channel of a navigable water of the United States.

Twenty-first. The diversion of the waters of Lake Michigan through the Chicago River in excess of the permits, will alter and modify the condition and capacity of Lakes Michigan, Huron, St. Clair, Erie, Ontario, the Rivers Sault Ste. Marie, St. Mary's, St. Clair, Detroit, Niagara and St. Lawrence, and the ports, roadsteads, havens, harbors, canals and harbors of refuge connected with the above named waters.

Twenty-second. Defendant cannot lawfully continue to divert and abstract water, in excess of the permits, as it is doing and threatens to do, without the recommendation of the Chief of Engineers and permission of the Secretary of War.

Prayer—That defendant be enjoined from diverting or abstracting any waters from Lake Michigan over, above and in excess of 250,000 cubic feet per minute, as already authorized by the Secretary of War.

Exhibit "A" to Bill of Complaint.

(Vol. VIII, Page 44.)

"Whereas, by Section 10 of an act of Congress approved March 3, 1899, entitled 'An act making appropriations for the construction repair and preservation of certain public works, on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to alter or modify the course, location, condition or capacity of the channel of any navigable water of the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same:

And whereas, the Sanitary District of Chicago, a m
nicipal corporation, organized under the laws of the St
of Illinois, has constructed an artificial channel fr
Robey street, Chicago, to Lockport, and has been here
fore granted permission by the Secretary of War
make certain improvements in the Chicago river for
purpose of correcting and regulating the cross sectio
the river so as to secure a flowage capacity of 300,
cubic feet per minute with a velocity of one and one-qu
ter miles an hour, it being intended to connect the s
artificial channel with the west fork of the south bra
of Chicago river at Robey street in the City of Chic

And whereas, The said Sanitary District of Chic
has now applied to the Secretary of War for permis
to divert the waters of the said Chicago river and ca
them to flow into the said artificial channel at Ro
street as aforesaid;

And whereas, The said Sanitary District of Chic
represents that such movable dams and sluice gate
are necessary to, at all times, secure absolute and c
plete control of the volume and velocity of flow thro
the Chicago river have been constructed;

Now, therefore, The Chief of Engineers having
sented thereto, this is to certify that the Secretar
War hereby gives permission to the said Sanitary
trict of Chicago to open the channel constructed
cause the water of Chicago river to flow into the s
subject to the following conditions:

1. That it be distinctly understood that it is the in
tion of the Secretary of War to submit the questions
nected with the work of the Sanitary District of Chi
to Congress for consideration and final action, and
this permit shall be subject to such action as ma
taken by Congress.

2. That if, at any time, it becomes apparent that
current created by such drainage works in the south
main branches of Chicago river, be unreasonably
structive to navigation or injurious to property, the
retary of War reserves the right to close said disch
through said channel or to modify it to such exte
may be demanded by navigation and property inte
along said Chicago river and its south branch.

3. The the Sanitary District of Chicago must as
all responsibility for damages to property and na

tion interests by reason of the introduction of a current in Chicago river.

Witness my hand this 8th day of May, 1899.

R. A. Alger, Secretary of War. (Seal War Office.)
John M. Wilson, Brig. Genl. Chf. of Engrs.
U. S. A."

Exhibit "B" to Bill of Complaint.

"Whereas, under date of May 8th, 1899, the Secretary of War granted permission unto The Sanitary District of Chicago to open the artificial channel from Robey street, Chicago, to Lockport, and cause the waters of Chicago river to flow into the same, upon the following condition, *inter alia*:

(2) That if, at any time, it becomes apparent that the current created by such drainage works in the south and main branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its south branch.

And whereas, It is alleged by various commercial and navigation interests that the present discharge from the river into the Drainage Canal sometimes exceeds three hundred thousand (300,000) cubic feet per minute, causing a velocity of nearly three (3) miles per hour, which greatly endangers navigation, in the present condition of the river.

Now, therefore, This is to certify that the Secretary of War, upon the recommendation of the Chief of Engineers, hereby directs said Sanitary District to regulate the discharge from the river into the Drainage Canal so that the maximum flow through the Chicago river and its south branch shall not exceed two hundred thousand (200,000) cubic feet per minute.

Witness my hand this ninth day of April, 1901.

Elihu Root, Secretary of War."

Exhibit "C" to Bill of Complaint.

"War Department, Washington

July 23, 1901.

SIR: Referring to War Department order of April 9th last, restricting the flow of water through the Chicago River under War Department permit of May 8, 1899 to 200,000 cubic feet per minute, and replying to your letter of the 15th instant, in which you request, for reasons stated, that the said order be amended to permit a flow of 300,000 cubic feet per minute between the hours of 4 P. M. and twelve o'clock midnight, I beg to inform you that I have this day approved the modification last referred to, which approval will be subject to revocation by the Department in case the increase shall prove to be dangerous to navigation.

Very respectfully, Elihu Root, Secretary of War.

Mr. Axelander J. Jones, President Sanitary District of Chicago, Chicago, Illinois."

Exhibit "D" to Bill of Complaint.

Whereas, Under date of May 8th, 1899, the Secretary of War granted permission unto the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport, and cause the waters of Chicago River to flow into the same, upon the following condition, *inter alia*:

(2) That if, at any time, it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch;"

And whereas, The Secretary of War subsequently directed said Sanitary District of Chicago, to regulate the discharge of water into the Chicago Drainage Canal so that the maximum flow through the Chicago River shall not exceed 200,000 cubic feet per minute from midnight to 4 p. m., nor 300,000 cubic feet per minute from 4 p. m. to midnight;

And whereas, Said Sanitary District of Chicago has applied to the Secretary of War for permission to increase the flow between midnight and 4 p. m., daily, to 250,000 cubic feet per minute; and the Chief of Engineers has recommended that the increase applied for be granted, but that the rate of flow from 4 p. m. to midnight be reduced to 250,000 cubic feet per minute, so that the flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day.

Now, therefore, This is to certify that, in acordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto the said Sanitary District of Chicago permission to regulate said discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, upon the following conditions:

(1). That this permission shall be in lieu of the present authorized rates of flow as stated above.

(2). That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

(3). That said Sanitary District of Chicago shall be responsible for all damages inflicted upon navigation interests by reason of the increase in flow herein authorized.

Witness my hand this 5th day of December, 1901.

W. Cary Sanger, Assistant Secretary of War."

Exhibit "E" to Bill of Complaint.

Whereas, under date of December 5, 1901, by an instrument supplementary to the original permission granted by the Secretary of War, May 8, 1899, to the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport, and cause the waters of the Chicago River to flow into the same, the Secretary of War, pursuant to authority reserved in said permission of May 8, 1899, gave permission to the Sanitary District of Chicago to regulate said discharge so that the maximum flow per minute throughout the twenty-four hours of the day, upon the following conditions *inter alia*:

'That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require;'

And whereas, The said Sanitary District of Chicago has applied for permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute during the closed season of navigation, in order to carry off the accumulations of sewage deposit which line the shores along the city;

Now, therefore, This is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto said Sanitary District of Chicago permission to increase the flow through the Chicago River from 250,00 cubic feet per minute to 350,000 cubic feet per minute, until the 31st day of March, 1903, after which date it shall be reduced to 250,000 cubic feet per minute, as now authorized, upon the following conditions:

(1) That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

(2) That said Sanitary District of Chicago shall be responsible for all damages inflicted upon navigation interests by reason of the increase in flow herein authorized.

Witness my hand this seventeenth day of January, 1903.

W. Cary Sanger, Assistant Secretary of War."

Exhibit "F" to Bill of Complaint.

"The Sanitary District of Chicago

Chicago, February 5th, 1912.

SIR: On behalf of the Board of Trustees of The Sanitary District of Chicago, I have the honor to apply for enlargement of the terms of an instrument executed by The Secretary of War May 8, 1899, as modified by instruments similarly executed on December 5, 1901, and June 30, 1910, respectively, in the following particulars and in view of the facts hereinafter set forth, to wit:

The flow of water from Lake Michigan through the canal of The Sanitary District of Chicago is now limited by the said instruments to 4167 cubic feet per second.

The population of the Sanitary District, the sewage of which is to be disposed of through the channels constructed and to be constructed by the said District, exceeds 2,500,000 persons, and is rapidly increasing. The only method at present available for disposing of the sewage of this population is by diluting the same with water withdrawn from Lake Michigan and flowing through the Chicago Drainage Canal. The least amount of water necessary to render sewage innocuous by the dilution method has been estimated by well recognized sanitary experts as 1,000 feet per second for every 300,000 inhabitants; so that the amount permitted to be withdrawn by the instruments to which reference has been made is much below the amount at present needed by the District.

The Sanitary District has been for some time engaged in investigating methods and devising plans for the treatment of the sewage with a view to requiring less water for its safe dilution in the future. The methods of other states and countries for such treatment of sewage, are not as yet entirely satisfactory to all concerned, and any changes of methods for large cities must necessarily require several years.

Until these experiments are concluded and proper works installed, the use of additional water from Lake Michigan is essential to the health of the large population of the City of Chicago and of the Sanitary District and of those who live adjacent to the Des Plaines and Illinois rivers into which such waters are discharged.

Subject therefore to such restrictions as to you may seem proper for the protection of the public interest, and to such a method of supervision as you may suggest to promote the general welfare, and pending the completion of the investigations now being conducted to render the use of increasing quantities of water in the future necessary; I have the honor to apply for permission for The Sanitary District of Chicago to withdraw from Lake Michigan through the Chicago river and Calumet river—not to exceed ten thousand cubic feet of water per second; such permission to be revocable at any time by The Secretary of War, and subject to such action as the Congress of the United States may see fit to take in the premises.

Respectfully submitted, George M. Wisner, Chief Engineer. Hon. Henry L. Stimson, Secretary of War, Washington, D. C."

Exhibit "G" to Bill of Complaint.

"In the matter of the Application of THE TRUSTEES OF THE SANITARY DISTRICT OF CHICAGO for Permission to Divert from Lake Michigan 10,000 Cubic Feet of Water Per Second.

War Department

Washington, January 8, 1913.

The Sanitary District of Chicago applies to the War Department for permission to increase the amount of water it is authorized to withdraw from Lake Michigan from 4,167 cubic feet per second, the amount now authorized, to 10,000 cubic feet per second.

The Chicago Drainage Canal was opened in January, 1900. It reversed the flow of the Chicago River, which formerly emptied into Lake Michigan, and as a result a portion of the waters of that lake, instead of following their former course through Lakes Huron, Erie and Ontario into the St. Lawrence, are now carried across the watershed into the Illinois River, and through that to the Mississippi and the Gulf of Mexico. The canal thus serves as a system of drainage for the City of Chicago, carrying the sewage of that city southward to the Mississippi, and thus protects the water supply of that city, which is taken from Lake Michigan.

Permission to divert water from Lake Michigan was first granted by my predecessor, Secretary Alger, on May 8, 1899. He permitted a flowage of 5,000 cubic feet per second, but his permit contained the following conditions:

1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

2. That if, at any time, it becomes apparent that the current created by such drainage works in the south and main branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as

may be demanded by navigation and property interests along said Chicago River and its south branch.

Subsequently, during the administration of Secretary Root, the amount of the current permitted to be taken was modified or restricted until December 5, 1901, when it was fixed at the amount now permitted, and these permits contained the condition—

that the permission herein given shall be subject to such modifications as in the opinon of the Secretary of War the public interests may from time to time require.

On March 14, 1907, an application made for permission to divert an additional 4,000 cubic feet per second for the purpose of reversing the current of the Calumet River and flowing that river also through the canal to drain the southern portion of Chicago was denied by Secretary Taft in an opinion in which he referred once more to the desirability of submitting 'this question of capital and national importance to the Congress of the United States.'

It is clear that even under the conditions heretofore manifested on these applications, the proposition to divert the waters of Lake Michigan into another watershed has not been entertained without hesitation and careful restriction by my predecessors. The propriety of obtaining congressional sanction for the project has been pointed out from the beginning; and the form in which the permit has been granted, even for the moderate amount of diversion permitted, has been so phrased as to indicate that the permission was predicated upon the absence of any substantial injury to commerce.

The sanitary canal has never received the direct sanction of Congress. It was build solely under the authority of the State of Illinois, as given in its 1889 general act for creating sanitary districts. And although pursuant to the suggestion of my predecessors the question of the propriety of its diversion of water from Lake Michigan was presented urgently in the reports of the Chief of Engineers for the years 1899 and 1900 as transmitted to Congress, no action upon the question has ever been taken by that body. In the argument before me it was urged that the present canal represented the growth and development of a national policy expressed in two acts of Congress, 1822 and 1827, which authorized the construction of a canal 'to connect the Illinois River with Lake Michigan,' thus connecting the two watersheds. (Acts of March 30, 1822, and March 2, 1827.) But these statutes

authorized a canal for the purpose of navigation and not sanitation. (*Missouri* v. *Illinois*, 200 U. S. 526.) The Illinois and Michigan Canal, actually constructed under their authority, derived its water for navigation purposes from the Calumet, Des Plaines, and Chicago Rivers, and not from the Lakes. And although in the latter part of its existence it was used to a very slight extent to help purify the waters of the Chicago River and thus sanitate the City of Chicago, such a purpose could not have been dreamed of at the time its construction was authorized by Congress, 90 years ago. I can not see that its authorization and construction offer the slightest congressional sanction for the great canal now under discussion, which was not even contemplated until much more than half a century later. Even at the time when the present canal was constructed and opened it is very evident that its ultimate possible effect upon the navigation of the Great Lakes was not clearly realized by those interested in that navigation. The evidence before me indicates that the withdrawal of water from Lake Michigan at Chicago would require about five years to produce its full effect upon the levels of the Great Lakes (see report of International Waterways Commission on Chicago Drainage Canal, p. 7) and that this effect would be still further observed by periodic oscillations in the lake levels. These facts may easily explain any inaction on the part of the Nation and their representatives to this withdrawal of water and make it clear that any argument of implied acquiescence must be scrutinized with unusual care.

In this respect the situation is now very different. The present application was opposed by representatives of 23 cities and 6 States interested in harbors and commerce upon the Great Lakes, notably the Cities of Duluth, Milwaukee, Toledo, Cleveland and Buffalo. It was opposed by representatives of the navigation interests engaged on the Chicago River as well as on the Great Lakes, and by the official representatives of the Canadian Government as well as private Canadian interests engaged in the navigation of the Lakes and the St. Lawrence River, including representatives of the Cities of Kingston and Montreal.

A very careful consideration of the voluminous evidence and statements submitted, as well as a consideration of the reports of other commissons and boards of engineers who have investigated the subject, leaves no doubt in my mind that the withdrawal of 10,000 cubic feet

per second would substantially interfere with the navigable capacity of the Great Lakes and their connecting rivers. The Chief of Engineers, whose statutory authority in passing upon this application is concurrent with and independent of my own, and whose opinion upon such a question of scientific conclusion must be given especial weight, so states in his recommendation. His conclusions are corroborated by the authority of other boards of investigation, notably the report of the International Waterways Commission of January 4, 1907.

Careful observations and calculations conducted under the offices of the United States Lake Survey and reported through the Chief of Engineers, covering observations for the last 46 years, indicate that a withdrawal of 10,000 cubic feet per second would reduce levels at various places as follows:

	Inches
Lakes Huron and Michigan	6.9
Lake St. Clair	6.3
Lake Erie	5.4
Lake Ontario	4.5
St. Lawrence River at Rapide Plat	4.8 plus

The foregoing effects would be produced at mean lake levels; the lowering effects would be much greater at low-water periods—the precise time when any additional shortage would be most keenly felt. This reduction would create substantial injury in all of the American harbors of the Great Lakes and in the St. Marys', St. Clair and Detroit Rivers. It would produce equal injury in Canadian harbors on the Great Lakes, and a still greater injury on the lower St. Lawrence, the Canadian officials claiming a probable lowering effect of 12 inches at Montreal at low water.

The United States has improved about 106 harbors and rivers on the Great Lakes affected by this diversion and has spent on such improvements over ninety millions of dollars. The Canadian Government has improved over 50 harbors on Georgian Bay and Lakes Huron, St. Clair, Erie and Ontario. By treaty, American vessels are accorded equal rights of navivation with Canadian vessels in all these waters, including the St. Lawrence River. The reduction of the water in these harbors and channels would diminish to just that extent the amount of these improvements, and would nullify to just that extent the effects of the moneys which have been appropriated for that purpose by the respective Governments. Connecting

various portions of these waterways are the two canals at the Sault Ste. Marie, the Welland Canal, and a number of canals on the St. Lawrence River. The available depth of water over one or all sills of each of these canals would be affected, and in some cases reconstruction might even be made necessary.

The enormous lake traffic which uses these harbors and these rivers is increasing with great rapidity, both in gross volume and in the size and average drafts of the vessels employed therein. The Chief of Engineers reports that to lower the water surface 6 inches would reduce the permissible load of one of the large modern vessels by from 300 to 550 tons, with a consequent loss of from $3,600 to $7,500 in freights for such vessel per season. The International Waterways Commission reported that it would be a conservative estimate which would make the loss to the navigation interests resulting from a reduction of 6 inches in the depth of water as $1,500,000 per annum, or a sum which, capitalized at 4 per cent., would amount to a loss of $37,500,000 (see third progress report of International Waterways Commission of Dec. 1, 1907, p. 24). The lowest careful estimate of injury to American vessels alone is reported by the Chief of Engineers at $1,000,000 per year.

The argument was made before me that, owing to the well-known fact that the levels of the lake vary, owing to winds and change of barometic pressure, by amounts even greater than the reduction which would be caused by this canal, therefore the proposed reduction is of no consequence. This argument is well disposed of in the report of the International Waterways Commission of January 4, 1907, on page 8, as follows:

It is evident that the average level of the lake may be lowered considerably without the change becoming immediately apparent, and that fact has been used as an argument to prove that the lowering caused by the Chicago Drainage Canal is of no consequence to those interested in navigation. Since they cannot see it they will not know it and will not feel it. The argument is fallacious. It is true that they cannot see it immediately, but they will soon feel it and will know it through the most costly means of acquiring knowledge—the injury to their material interests. The oscillations will remain the same as before, but low water will fall lower and high water will rise less high. The average draft of vessels must be diminished by the amount that the average

level is lowered unless the depth be restored by remedial works.

In a word, every drop of water taken out of Chicago necessarily tends to nullify costly improvements made under direct authority of Congress throughout the Great Lakes, and a withdrawal of the amount now applied for would nullify such expenditures to the amount of many millions of dollars, as well as inflict an even greater loss upon the navigation interests using such waters.

On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. There is involved in this case no issue of conflicting claims of navigation. The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a deep waterway from the Great Lakes to the Mississippi over the route of the sanitary canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over 1,000 feet per second, or less than a quarter of the amount already being used for sanitary purposes in the canal. This estimate is confirmed by the report of the special board of engineers on the deep waterway from Lockport, Ill., to the mouth of the Illinois River, dated January 23, 1911. It is also confirmed by the practical experience of the great Manchester Ship Canal in England. From the standpoint of navigation alone in such a waterway too great a diversion of water would be a distinct injury rather than a benefit. It would increase velocity of the current and increase the danger of overflow and damage to adjacent lands.

We have, therefore, presented in this case claims of entirely different characters and jurisdictions — the claim of sanitation on the one side and of navigation on the other; the vital interest of a single community on the one side and the broad interest of the commerce of the nation on the other. The discretion given to the Secretary of War under sections 9 and 10 of the act of 1899 is very broad, but I have very grave doubts as to whether it was intended to authorize him to grant a permit which would inflict a substantial injury upon commerce in order to benefit sanitation. The entire purpose and scope of that legislation was to make him the guardian of commercial interests of the nation represented in their waterways. And while he sometimes under that statute must decide that the interests of one class of transportation

are less important and must yield to the conflicting interests of another class. I have considerable doubt whether it was intended to give him authority to sacrifice substantial interests of navigation to entirely different claims over which he normally has no jurisdiction whatever.

But however that may be, and without resting my decision upon the question of my legal authority, I am quite clear as a matter of discretion that under the facts presented by this case no further diversion of water should be permitted at Chicago without the direct sanction of the Congress of the United States. I do not for one moment minimize the importance of preserving the health of the great City of Chicago; but when a method of doing this is proposed which will materially injure a most important class of the commerce of the nation and which will also seriously affect the interests of a foreign power, it should not be done without the deliberate consideration and authority of the representatives of the entire nation. The growth of Chicago is phenomenal and its representatives are quite unwilling to put any final limit to the demand which may be made upon the waters of Lake Michigan for its sanitation under the system now in use. I have before me the report of 1911 of the president of the sanitary district in which he says:

I am of the opinion that the presumption that our water supply is to be limited to 10,000 cubic feet per second, or 600,000 cubic feet per minute, is gratuitous and mischievous and should not be voiced by the officials of this district. I believe that we should have the volume requisite to our needs as they appear and are justified.

It is therefore quite conceivable that compliance with their sanitary needs according to this method of sanitation may eventually materially change this great natural watercourse now existing through the Lakes. The weighing of the sanitation and possibly the health of one locality over against the commerce of the rest of the Nation and the consideration of our relations and obligations to Canada in respect to a great international waterway are not matters of mere technical or scientific deduction. They are broad questions of national policy. They are quite different in character, for example, from the question of fixing the proper location of a pierhead line or the height or width of a drawbridge over a navigable stream—fair samples of the class of questions which come to the Secretary of War for decision under

the above-mentioned act of 1899. While the researches and opinions of experts in the respective fields are necessary and useful as an assistance toward reaching a fair and proper policy, the final determination of that policy should belong not to an administrative officer but rather to those bodies to whom we are accustomed to entrust the making of our laws and treaties.

In my view of the proper exercise of my discretion in this matter the foregoing considerations are sufficient for a decision of this case. Having reached the conclusion that the proposed diversion of the waters of Lake Michigan would substantially injure the interests of the navigation on the Great Lakes which it is my legal duty to protect, it would clearly follow that the present application should be denied.

I have carefully examined, however, the evidence which both sides have introduced bearing upon the sanitary needs of the City of Chicago, and my conclusion is in no way shaken. I am not persuaded that the amount of water applied for is necessary to a proper sanitation of the City of Chicago. The evidence indicates that at bottom the issue comes down to the question of cost. Other adequate systems of sewage disposal are possible and are in use throughout the world. The problem that confronts Chicago is not different in kind but simply larger and more pressing than that which confronts all of the other cities on the Great Lakes, in which nearly 3,000,000 people of this country are living. The urban population of those cities, like that of Chicago, is rapidly increasing, and a method of disposition of their sewage which will not injure the potable character of the water of the Lakes must sooner or later be found for them all. The evidence before me satisfies me that it would be possible in one of several ways to at least so purify the sewage of Chicago as to require very much less water for its dilution than is now required by it in its unpurified condition. A recent report of the engineers of the sanitary commission (Oct. 12, 1911) proposes eventually to use some such method, but proposes to postpone its installation for a number of years to come, relying upon the present more wasteful method in the meanwhile. It is manifest that so long as the city is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage. This is particularly true in

view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport. But it must be remembered that for every unit of horsepower realized by this water at Lockport four units of similar horsepower would be produced at Niagara, where the natural conditions are so much more favorable. Without, therefore, going more into detail in a discussion of this question, I feel clear that no such case of necessity has been presented by the evidence before me as would justify the proposed injury to the many varied interests in the great waterways of our lakes and their appurtenant rivers.

It remains only to consider certain special arguments that have been pressed upon me: It has been urged that the levels of the lakes, even if lowered, could be restored by compensating works. To a certain extent that is true. But the very nature of this consideration offers another illustration of the importance of having the whole question passed upon by Congress. Such compensating works can only be constructed by the authority of Congress and at very considerable cost. It is not a matter which is in the hands of the Secretary of War. Permission to divert water which will at one and the same time nullify the effect of past appropriations and make necessary similar expenditures in the future, should be granted only with the express consent of the body in whose hands the making of such appropriations and the authorization of such works rest.

Furthermore, in most cases such compensating works could only be constructed with the joint consent of our neighbor Canada. The United States Government alone would be unable, even if it were willing to spend its own funds, to compensate for the damage done through the lowering of these levels unless Canada were willing to join in constructing the portion of such works which would necessarily stand upon Canadian soil.

The question therefore becomes not merely national but international, and this leads me to the consideration of the arguments which were urged by both sides in reference to the treaty with Great Britain in respect to Canada of January 11, 1909. A careful consideration of that treaty fails to indicate to me that it is in any way controlling upon the questions now before me. It gives to the citizens of both countries certain mutual rights of navigation in the waters of the Great Lakes and their connect-

ing rivers; but beyond that the question of the right to this diversion at Chicago seems to me to have carefully excluded. The applicants for the permit have urged upon me that article 8 of the treaty gives a preference to the uses of water of the lakes for domestic and sanitary purposes over the uses of such water for navigation. Article 8, however, applies only to future cases brought before the International Joint Commission; and furthermore I am clearly of the opinion that the domestic and sanitary purposes referred to in that article were intended to be the "ordinary" uses of such waters for domestic and sanitary purposes referred to in article 3. It would be quite contrary to our own national policy to give such a preference to an extraordinary sanitary use of such a character as to create a substantial injury to navigation. The matter has been before our own Supreme Court in the case of the Unites States v. the Rio Grande Dam & Irrigation Co. (174 U. S., 690). In that case the Supreme Court held that a company which proposed to take the water of the Rio Grande river for the purpose, among others, "of supplying water to cities and towns for domestic and municipal purposes" could be prevented from so doing when the result would be a substantial injury to the navigability of the Rio Grande river farther down. In its opinion the court said:

The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact. In the course of the argument, this suggestion was made, and it seems to us not unworthy of note, as illustrating this thought. The Hudson river runs within the limits of the State of New York. It is a navigable stream and a part of the navigable waters of the United States, so far at least as from Albany southward. One of the streams which flows into it and contributes to the volume of its waters is the Croton river, a non-navigable stream. Its waters are taken by the State of New York for domestic uses in the City of New York. Unquestionably the State of New York has a right to appropriate its waters, and the United States may not question such appropriation, unless thereby the navigability of the Hudson be disturbed. On the other hand, if the State of New York should, even at a place above the limits of navigability, by appropriation for any domestic purposes, diminish the volume of waters, which, flowing into the Hudson, make it a navigable stream, to such an extent as to destroy its navigability,

undoubtedly the jurisdiction of the National Government would arise and its power to restrain such appropriation be unquestioned; and within the purview of this section (act of Sept. 19, 1890, ch. 907) it would become the right of the Attorney General to institute proceedings to restrain such appropriation.

The treaty, however, contains provisions in its article 10 by which "any questions or matters of difference arising between the high contracting parties involving the rights, obligations, or interests of the United States or of the Dominion of Canada, either in relation to each other or to their respective inhabitants, may be referred for decision" to an international joint commission established by the said treaty. The hearing before me brought forth the fact that the Government of Canada regards the proposal contained in this application as one which affects the material interests of that country. The establishment by formal treaty between the two countries of a tribunal with jurisdiction to decide just such questions seems to me to afford an additional reason against the assumption of jurisdiction to decide the question by an administrative officer of one of those countries.

In short, after a careful consideration of all the facts presented, I have reached the following conclusions:

First. That the diversion of 10,000 cubic feet per second from Lake Michigan, as applied for in this petition, would substantially interefere with the navigable capacity of the navigable waters in the Great Lakes and their connecting rivers.

Second. That that being so, it would not be appropriate for me, without express congressional sanction, to permit such a diversion, however clearly demanded by the local interests of the sanitation of Chicago.

Third. That on the facts here presented no such case of local permanent necessity is made evident.

Fourth. That the provisions of the Canadian treaty for a settlement by joint commission of "questions or matters of difference" between the United States and Canada offer a further reason why no administrative officer should authorize a further diversion of water, manifestly so injurious to Canada, against Canadian protest.

The prayer of the petition is therefore denied.

Henry L. Stimson, Secretary of War."

Answer of the Sanitary District of Chicago to complaint in the Main Channel suit—filed January 16, 1914, as follows (Vol. VIII, pp. 58-126, including exhibits):

(1) Admits it is municipal corporation, organized under the laws of Illinois, as charged in the bill of complaint; a copy of the original act under which the defendant was organized, passed May 29, 1889, is attached as Exhibit A.

(2) Admits the Chicago River is situated in Cook County, and originally flowed in a general easterly direction and is formed as described. Exhibit B, attached, shows the location of the river exactly.

(3) Admits the Chicago River and its branches are navigable waters of the United States.

(4) Admits the United States has expended the amount of money alleged in the bill of complaint, in improving the navigable capacity of said river and the harbor at its mouth.

Avers that $2,389,527.10 of said amount was expended in the improvement of the harbor at the mouth of said Chicago River; that down to the year 1896, the complainant had expended no money in the improvement of the Chicago River itself. That the balance of that original sum, namely, the sum of $1,626,539.20, was expended by complainant in and about the improvement of the Chicago River between the year 1896 and June 30, 1913; that the City of Chicago, beginning with the year 1861 and ending the first day of January, 1913, has expended in the improvement of the Chicago River, $6,272,574.52; that the defendant, the Sanitary District, has expended in the improvement of the Chicago River, in addition to the amounts expended by the City of Chicago, the sum of $10,640,739.52; that defendant made said expenditures for the purpose of enabling it to cause the flow of the several amounts of water provided for under the laws of Illinois, and the expenditures by the defendant did improve the capacity and navigability of said Chicago River and its several branches.

(5) Admits the passage of the Rivers and Harbors Act of March 3, 1899, and the continuance in force of Section 10 thereof.

(6) Denies that application was made by defendant for permission to divert any certain quantity of water from Lake Michigan through said Chicago River and its main channel. Avers that application was made to the Secretary of War for permission to open the channel constructed and cause the water of the Chicago River to flow into same, pursuant to and under the Act of May 29, 1889; that in the said permit the Secretary of War stated that he reserved the right to close said discharge or to modify it to such an extent as might be demanded by navigation and property interests along said Chicago River and its south branch.

(7) Admits the order of Secretary of War of April 9, 1901, concerning the limitation of flow to 200,000 cubic feet per minute.

(8) Admits the issuance of the order of July 23, 1901.

(9) Admits the issuance of the order of December 5, 1901.

(10) Admits the issuance of the order of the Secretary of War of January 17, 1903.

(11) Admits the application to the Secretary of War of November 28, 1906, for permission to construct a canal connecting the Calumet River with the main channel of defendant, and the refusal of the Secretary of War of March 14, 1907, to grant said permit. A copy of the statement of the Secretary of War is attached as Exhibit C.

(12) Admits the permit of September 11, 1907, to construct a canal connecting Lake Michigan at Wilmette, to the north branch of the Chicago River, a copy of which is attached as Exhibit D.

(13) Admits the issuance of the permit of June 30, 1910, with reference to the construction of the Calumet Sag Channel, a copy of which is attached as Exhibit E.

(14) Admits the making of the application of February 5, 1912, to divert 10,000 cubic feet of water per second through the Chicago and Calumet Rivers.

(15) Admits the refusal of the Secretary of War of January 8, 1913, to grant said application of February 5, 1912.

(16) Denies that defendant has, for a long period of time, diverted and abstracted from Lake Michigan, and is at present diverting 400,000 to 600,000 cubic feet of water per minute, as charged in the bill of complaint.

(17) Denies the diversion of water from Lake Michigan in excess of the amount of 250,000 cubic feet of water per minute has lowered or will lower the levels of Lakes Michigan, Huron, St. Clair, Erie, Ontario, the Rivers Sault Ste. Marie, St. Mary's, St. Clair, Detroit, Niagara and St. Lawrence, or any of them, or any of the harbors, channels, canals or rivers connected therewith, or will injure or diminish or create an obstruction to the navigable capacity of said rivers, as charged.

(18) Neither denies nor affirms the allegation as to the amount of the expenditure by the United States in improving said harbors and channels. Denies that the diversion of waters from Lake Michgan in excess of the permits, has or will have a tendency to undo or annul the orders of Congress, as charged.

(19) Denies that the diversion from Lake Michigan in excess, or substantially in excess, of the amount provided by the permits of the Secretary of War, will modify the condition and capacity of the channel of the Chicago River, as charged.

(20) Denies that the diversion from Lake Michigan in excess of permits, will alter or modify the condition and capacity of Lakes Michigan, Huron, St. Clair, Erie, Ontario, the Rivers Sault Ste. Marie, St. Mary's, St. Clair, Detroit, Niagara and St. Lawrence, or any of them, and the ports, roadsteads, havens, harbors, canals and harbors of refuge

connected with the above named waters, or any of them. Denies that defendant cannot lawfully continue to divert and abstract waters from Lake Michigan as it now does, or that it cannot lawfully divert and abstract, without the permission of the Secretary of War, waters from Lake Michigan under the laws of Illinois, and by and through the channels and works it has already constructed; that complainant will be in any manner injured by the diversion through its works; that interstate navigation and commerce will in any manner be injured by the abstraction, pursuant to and under the laws of Illinois, and as contemplated by the channels and works of the defendant.

The remainder of the answer consists of affirmative allegations as follows:

(21) The Sanitary District is a municipal subdivision of the State. The area within its territorial limits is 386.2 square miles, located on the shore of Lake Michigan at its southwest end. The shore line is thirty-three miles long and the Sanitary District limits extend westward from the shore line a distance from six to fourteen miles. The drainage naturally is to Lake Michigan, for the most part through the Chicago and Calumet Rivers and their branches. The DesPlaines River rising in Wisconsin twelve miles from the Lake Michigan shore flows in a southerly direction at a distance of about ten miles from the lake paralleling it until the DesPlaines reaches a point fifteen miles southwest of the mouth of the Chicago River when it turns to the southwest a distance forty-five miles beyond, and empties into the Illinois River. Between Lake Michigan and the DesPlaines River, six miles from the shore line is an elevation of approximately eleven feet above the low water level of the lake. This is known as the Continental Divide, or the height of land on one side of which water flows into the Great Lakes thence into the Gulf of St. Lawrence, and on the other side of which water flows into the DesPlaines River, thence into the Illinois and Mississippi Rivers, then to the Gulf of Mex-

ico. By water trail from the mouth of the Chicago River, the lowest point in said Continental Divide is about eight miles. At this point there was located on the summit of said Divide a lake known as Portage Lake and later called Mud Lake. At times of high water, the DesPlaines River rose to the level of said lake and discharged itself over the divide and through the Chicago River into Lake Michigan. The land lying east of said divide is low, flat, level and swampy, and devoid of hills or elevations so that in times of high water large portions of said territory were inundated. The City of Chicago was established at the mouth of the Chicago River, located approximately in the center of the territorial limits of this defendant and, as it has expanded, has stretched out over the branches of the Chicago River. From the time when the site where the City of Chicago is now located, was settled, it has been menaced by floods and has had to contend with the natural disadvantages which it suffered by reason of the fact that the city was situated upon a flat, low, sandy soil and at the outlet or discharging point of a large drainage area. Prior to the organization of Chicago, from the time this part of the territory of North America was discovered, a trading post was located at the mouth of the Chicago River. In 1778 there was a fort, known as Fort Dearborn, which was destroyed in the massacre of 1812. Fort Dearborn was rebuilt by the United States in 1816. In 1837, the village of Chicago was organized with 709 lawful voters. By 1854, there were 40,000 people in Chicago. From the very beginning, because of the flat, low, marshy and sandy soil, and only a slight elevation above the level of Lake Michigan, the city was confronted with the necessity of constructing a sewer system. It raised the level of its streets. Between 1854 and 1889, sewers were so constructed that in the City of Chicago, north of the Chicago River, they drained into the Chicago River as far north as the boundaries of the City of Chicago. Territory lying to the west of the north and south branches of the Chicago river was drained by sewers into the river. Territory lying south of the Chicago

River and east of State street, drained directly into Lake Michigan, that is, sewers were constructed at 12th street, 22d street and 31st street, which emptied directly into the lake. The territory above described as being within the boundaries of the City of Chicago as it existed in 1889 was bounded on the north by Fullerton avenue, at a distance of two and one-half miles north of the Chicago River, on the west by Western avenue at a distance of between four and five miles west of Lake Michigan, and on the south by 39th street, a distance of approximately four and one-half miles south of the mouth of the Chicago River.

(22) South of 39th street and adjoining the City of Chicago was the Village of Hyde Park, with a population in 1889 of 41,000, the largest part of which had sewers emptying directly into Lake Michigan. West of Hyde Park was the Town of Lake, with a population of 58,661 in 1889, the sewage of which emptied into the South Fork of the South Branch of the Chicago River. Situated north of Fullerton avenue and adjoining the City of Chicago was the Town of Lake View with a population of 42,339, which had several sewers emptying into the North Branch of the Chicago River. And situated west of the Town of Lake View was the Town of Jefferson, with a population of 10,662, the sewers of which emptied into the North Branch of the Chicago River. The population of Chicago in 1889 was 802,651. The discharge of the sewage of Chicago and its adjoining suburbs either into Lake Michigan directly or indirectly by way of the Chicago River and its branches polluted the water supply of this great population. Conditions of pollution were such that it became necessary to create The Sanitary District of Chicago for the purpose of removing said pollution and providing the way, as hereinafter more fully shown, of disposing of the sewage of the City of Chicago and its adjacent towns and villages.

(23) When Chicago was first organized, the people of the village obtained their drinking water from shallow wells sunk into the sand, the water in said wells finding its way

by seepage from Lake Michigan and the Chicago River. As Chicago grew, the wells became polluted by sewage and by drainage that washed into said wells necessitating large numbers of people obtaining their water supply directly from Lake Michigan. This water was first obtained by means of wagons carting the water from the lake to individual users. Later wooden pipes were laid in the streets, which drew water from the lake. Still later, a tunnel was extended to Lake Michigan and the Chicago avenue crib was built to prevent the ends of the tunnels being injured or choked by ice in the winter time. Finally, the City of Chicago, or the towns and villages located near it and herein mentioned, built in Lake Michigan six intakes, cribs and tunnels connected therewith for the purpose of obtaining water from Lake Michigan, as follows:

The Lake View crib on the northern extremity of said city, at a distance of two miles from the shore of Lake Michigan; the Carter H. Harrison crib, situated at a distance of three miles from the shore; the Chicago avenue crib, situated at a distance of two miles from the shore; the Four Mile crib, situated approximately four miles from the shore and opposite the most densely populated portion of said City of Chicago, and the Hyde Park and Edward F. Dunne cribs, two miles off shore, situated near the southern extremity of said city. At points along the shore, pumping stations were erected by means of which water is pumped through said tunnels and distributed through pipes or water mains to the people of Chicago and adjoining towns. The distributing system is interconnected so that in case any one crib or tunnel should be incapacitated, the other tunnels would furnish water to the people. The City of Chicago has expended, in and about the construction of said cribs and tunnels, and in the construction of distributing pipes and distributing tunnels, large sums of money, in excess of $59,042,565. There is no other source of water supply for the inhabitants of Chicago and its adjoining towns than Lake Michigan.

(24) From the earliest discovery of this country, there has existed between Lake Michigan and the Mississippi River a water route used as a highway of trade and travel. This water route originally consisted of the Chicago River, its South Branch and the West Fork thereof, a ditch or canal in wet seasons and a portage in dry seasons from thence into a lake known as Mud Lake, and a ditch or canal in wet seasons and a portage in dry seasons from said Mud Lake into the DesPlaines River to the Illinois River and thence into the Mississippi River. The said route was used for the purpose of carrying on trade and for the purpose of travel for upwards of 160 years, and said use was prior to any improvements made by the United States or by the government then controlling the country now known as Canada. During said period, also, from the lower end of Lake Michigan through the Great Lakes and their connecting waters to the Atlantic Ocean, there were two water routes, one by way of a portage around Niagara Falls and from thence on the St. Lawrence River to the Atlantic Ocean; the other water route consisted of a route through Georgian Bay, Lake Nipissing and down the Ottawa River into the St. Lawrence River and thence to the Atlantic Ocean. The two water routes from the lower end of Lake Michigan to the Atlantic Ocean and the one to the Gulf of Mexico were used for the purpose of trade and travel up to approximately the year 1830. About the year 1822, there was a great demand for the improvement of these water routes and on March 30, 1822, the Congress of the United States passed an Act granting to the State certain public lands for the purpose of aiding the State in constructing a canal "connecting the Illinois River with the southern end of Lake Michigan." Said Act was entitled "An Act to Authorize the State of Illinois to Open a Canal Through the Public Lands to Connect the Illinois River with Lake Michigan." Section 1, among other things provided:

> "That the State of Illinois be, and is hereby authorized to survey and mark, through the public lands of the United States, the route of the canal connecting the Illinois River with the southern bend of Lake Michigan; and

ninety feet of land on each side of said canal shall be forever reserved from any sale to be made by the United States, except in the cases hereinafter provided for, and the use thereof forever shall be, and the same is hereby vested in the said State for a canal, and for no other purpose whatever; on condition, however, that if the said State does not survey and direct by law said canal to be opened, and return a complete map thereof to the treasury department, within three years from and after the passage of this act; * * * and grant hereby made shall be void and of none effect;"

The State of Illinois did not, within the time provided by the Act, cause a survey to be made and the grant in said Act lapsed. On January 28, 1826, the General Assembly of Illinois memorialized Congress setting forth the advantages of a canal to unite the waters of Lake Michigan with the Illinois River. The action of the government of Great Britain in refusing to the citizens of the United States free navigation of the St. Lawrence River also made it necessary for the United States to provide a free and unobstructed water route from the Great Lakes to the Atlantic Ocean by way of the Des Plaines River, Illinois and Mississippi Rivers, and the Gulf of Mexico. Thereupon, on March 2, 1827, the Congress of the United States passed an Act entitled "An Act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan." Section 1 of said Act is, in part, as follows:

"* * * That there be and hereby is granted to the State of Illinois, for the purpose of aiding the said State in opening a canal to unite the waters of the Illinois River with those of Lake Michigan, a quantity of land equal to one-half of five sections in width, on each side of said canal, and reserving each alternate section to the United States, to be selected by the Commissioner of the Land Office, under the direction of the President of the United States, from one end of the said canal to the other; Provided, That the said canal when completed, shall be and forever remain a public highway for the use of the Government of the United States, free from any toll, or

other charge, whatever, for any property of the United States, or persons in their service passing through the same;"

On January 9, 1836, the General Assembly of Illinois passed an Act under which the said Illinois-Michigan canal was built to unite the waters of the Illinois River with those of Lake Michigan, entitled, "An Act for the Construction of the Illinois and Michigan Canal," Section 16 of which Act is as follows:

> "That said canal shall not be less than forty-five feet wide at the surface, thirty feet at the base, and of sufficient depth to insure navigation, to be supplied with water from Lake Michigan and such other sources as the Canal Commissioner may think proper, and to be constructed in the manner best calculated to promote the permanent interests of the country, reserving ninety feet on each side of said canal to enlarge its capacity whenever in the opinion of the Board of Canal Commissioners the public good shall require it."

The plan of said canal as contemplated under the said Act of January 9, 1836, provided for a flow of water from Lake Michigan by gravity into and through the canal and from thence into the Illinois River and was known as the "Deep-Cut" plan. On account of lack of funds, the State was unable to immediately construct the said canal on the deep cut plan and it was constructed on what was known as the shallow cut plan and completed in the year 1848. Water to partly operate the same was obtained from Lake Michigan by means of pumps. From the time the canal was opened until the construction of the main channel of the Sanitary District, it furnished a partial outlet for the sewage and drainage of Chicago. As the needs of the city required, said canal was enlarged so as to provide a better and more suitable outlet. About the year 1860, to meet the demands of increased population, larger pumps were installed to pump more water from Lake Michigan through the Chicago River into the Illinois and Michigan Canal. In the year 1865, to meet the further needs of Chicago, the General Assembly of Illinois passed an

Act entitled "An Act to Provide for the Completion of the Illinois and Michigan Canal upon the plan adopted by the State in 1836," which said Act is in part as follows:

> "Whereas, it has been represented that the City of Chicago, in order to purify or cleanse Chicago River, by drawing sufficient quantity of water from Lake Michigan, directly through it, and through the summit division of the Illinois and Michigan Canal, would advance a sufficient amount of funds to accomplish this desirable object; and,
>
> Whereas, the original plan of said canal was to cut down the summit so as to draw a supply of water for navigation directly from Lake Michigan, which plan was abandoned for the time being, after a large part of the work had been executed, only in consequence of the inability of the State to procure funds for its further prosecution; • • •
> now therefore, • • •
>
> Be it enacted by the People of the State of Illinois, represented in the General Assembly: That to secure the completion of the Illinois and Michigan Canal upon the original "deep cut" plan, with such modifications and changes of line, if necessary, as will most effectually secure the thorough cleansing or purification of the Chicago River, and facilitate the execution of the work, the City of Chicago, through its constituted authorities, may at once enter into an arrangenment with the board of trustees of said canal, with a view to the speedy accomplishment of the work."

The work of completing the said canal by the City of Chicago was completed about the year 1871. Thereafter, water of Lake Michigan was drawn through said canal by gravity and about the year 1884, pumps were installed at Bridgeport, the northern terminus of the canal, whereby a larger quantity of water was withdrawn from Lake Michigan through the Chicago River and said canal, all pursuant to a resolution of the General Assembly of Illinois passed in the year 1881, which resolution is in part as follows:

> "Whereas, The State of Illinois, in General Assembly, did, on the sixteenth day of February, 1865, grant and authorize the City of Chicago in the State of Illinois, to

deepen the Illinois and Michigan canal for the purpose of, and with the intent to better the system of sewage of the said City of Chicago by permitting a free flow of water from Lake Michigan through the Chicago River and said canal to the Desplaines and Illinois Rivers; and the City of Chicago did perfect said improvement in conformity with said permission; * * *

Whereas, the deepening of the canal as aforesaid has proved to be totally inadequate for the purposes intended, and the large amount of sewage of the City of Chicago, being far greater than the capacity of the canal and the water now passing through it to deodorize and render innocuous; and

Whereas, The foulness of the water annually causes the death of millions of fish in the Desplaines and Illinois Rivers, that float to the shores and decay; * * *

Whereas, The supplying of the canal from these sources will so dilute and weaken the sewage of the City of Chicago, as to greatly relieve it of its foulness and stench to the great delight, relief and health of the peoples near to and bordering upon the line of the canal, the Desplaines and Illinois Rivers; therefore be it Resolved"

The resolution then provided that the City of Chicago should cause pumps to be installed at the northern terminus of the canal whereby at least 60,000 cubic feet of water per minute should be pumped from the Chicago River into the canal.

(25) Lake Michigan was, is and will be the only adequate source from which drinking water for the metropolitan population of Chicago and its environs could or may be obtained, and the supply is adequate, sufficient and pure if unpolluted by sewage or drainage. The additional flow of water to the Illinois and Michigan Canal created by the pumping works installed in 1884 at Bridgeport did not serve to cleanse sufficiently the Chicago River of pollution. During a portion of each year, the Chicago River did flow into the lake thus carrying with its waters the sewage and drainage of Chicago and its environs, polluting the water of Lake Michigan. The population had increased so that the improvements made from time to time up to the year 1884 were insufficient and

inadequate to prevent the pollution of the lake, thus depriving the inhabitants of Chicago and its environs of a pure water supply for domestic purposes. Thus it became necessary that some further and better improvements be made by which the pollution of the drinking water of the inhabitants of Chicago would be prevented. The death rate from typhoid fever and other water-borne diseases had become very high and deaths from such causes were frequent through the City of Chicago and adjacent towns. The Chicago River and its branches were then a seething mass of septic sludge giving forth noxious and disagreeable odors which caused annoyance and danger to the people of Chicago and persons sojourning within its limits. Thereupon, the City of Chicago appointed a commission consisting of eminent sanitary experts for the purpose of making an investigation of the conditions, and a report as to the proper solution of the problem then confronting the people of Chicago and its environs who depended upon Lake Michigan for their water supply. The commission was appointed in the year 1886 and presented a report to the Mayor of the city recommending the construction of a channel and works connected therewith, substanially as provided for in the Act of May 29, 1889, under which The Sanitary District was organized. The said Act was passed, pursuant to the investigation and report of said commission and other investigations carried on at the same time by other persons. Said Act was passed for the purpose of providing for the organization of The Sanitary District of Chicago and the construction of channels and works by it, so that the pollution of the drinking water of Chicago and its environs would be relieved and a pure supply could be secured.

(26) By the Act of May 29, 1889, the Sanitary District was authorized to construct a channel of sufficient size to take care of not only the sewage and drainage of the City of Chicago and its environs, but also the sewage and drainage as the increase of population might require. The channel to be constructed was fixed by said Act with a capacity and size to produce a flow through the rock sections thereof,

not less than 600,000 cubic feet of water per minute and to produce and maintain a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of population in the Sanitary District. The Chicago River drainage area is approximately 420 square miles, the maximum run of which is approximately 10,000 cubic feet of water per second or 600,000 cubic feet per minute. In order to prevent the Chicago River from flowing into the lake and carrying the sewage into Lake Michigan, it was necessary that the channel so to be constructed should have a capacity of not less than 10,000 cubic feet of water per second, the maximum run-off of the Chicago River drainage area. In order to prevent the pollution of the waters of Lake Michigan by water of the Calumet River, it was necessary that a channel be constructed connecting the Calumet River with the main channel so that the Calumet River would be reversed. It was further provided by said Act under which the Sanitary District was organized that the channel when completed should be a navigable water of the United States and that the United States should have the authority to take over and operate said channel for navigation purposes, but not for sanitary or drainage purposes. The said channel to be constructed was intended to be an enlargement or replacement of the channel known as the Illinois and Michigan Canal.

(27) Pursuant to said Act of the General Assembly of May 29, 1889, the Sanitary District was organized by vote of the people on the 5th day of November, 1889, and the first trustees were elected December 12, 1889. On January 18, 1890, this board of trustees held a regularly organized meeting of the board to begin the actual work of constructing the Sanitary District channel provided for under said Act. The Sanitary District entered upon the construction of said main channel and other works long prior to September 19, 1890, and laid out plans for and entered upon the construction of its channel with a capacity of 840,000 cubic feet per minute or 14,000 cubic feet per second. Plans were at the same time made and considered for the construction of a channel to

connect the Calumet River with the said main channel; for the construction of intercepting sewers on the south side of the city converging at 39th street on the Lake Shore by which approximately 2,000 cubic feet of water per second should be pumped from Lake Michigan together with sewage accumulated at said point, through a conduit to be constructed into the South Fork of the South Branch of the Chicago River, and from thence into the said main channel. Said intercepting sewers so provided for on the south side of the city and converging at 39th street, were for the purpose of intercepting sewage then flowing directly into Lake Michigan, and thereby divert it into the main channel. The North Branch of the Chicago River was then a stagnant stream into which sewage from a large portion of the north side emptied. In order to create a current into said North Branch and thereby cleanse it and abate a public nuisance, plans were made for the construction of a conduit extending from the Lake Shore at Lawrance avenue in the City of Chicago to the said North Branch through which approximately 666 cubic feet of water per second from Lake Michigan should be caused to flow, and from thence into the main channel. It was contemplated that approximately 1,000 cubic feet per second of water from Lake Michigan should be caused to flow through said North Shore channel, together with said sewage and drainage from said district. Plans were then made for enlarging the cross section of the Chicago River, South Branch and West Fork to accommodate sufficient water so as to cause the course, current and flow of the Chicago River to be at all times reversed, in times of high water as well as in times of low water, and to provide for an ultimate flow through the Sanitary District main channel of sufficient water to dilute and purify the sewage of the City of Chicago and its environs flowing into the main channel, pursuant to the provisions of said Act of 1889. At that time the defendant, Sanitary District, entered upon the construction of said works. The complainant, the United States, had knowledge of said act and the improvements provided for under said Act.

(28) Pursuant to said Act of 1889, and said plans, the Sanitary District constructed a channel through what is known as the rock section of the route described, extending from the controlling works at Lockport north to Willow Springs, a distance of 14.93 miles, with a bottom width of 160 feet, a surface width of 162 feet, with a depth of at least twenty-four feet, and with a declivity of one foot in every 20,000 feet, having a capacity of flowing 840,000 cubic feet per minute or 14,000 cubic feet per second. From said Willow Springs to Robey street, a distance of 13.1 miles through what is known as the earth section, the defendant made plans for a channel with a bottom width of 202 feet and a surface width of 300 feet and a depth of not less than twenty-four feet, with a declivity of one foot in every 40,000 feet, Said defendant constructed said channel through said earth section as planned, except in this, that for a distance of 7.8 miles from Robey street to Summit the defendant left unexcavated a width of ninety two feet, inasmuch as said channel was not territory having a rocky stratum and was more easily capable of progressive development as the population of the District might increase. The capacity of said channel from Robey street to Summit, being a portion of the earth section was eighty percent of the flow of the rock sections, or 500,000 cubic feet of water per minute, or 8,000 cubic feet of water per second. Long prior to the filing of the bill of complaint, this defendant made and entered into a contract with the Great Lakes Dredge & Dock Company, under which the said main channel in the earth sections was to be enlarged by widening the same, so that through the said earth section, the said main channel would have a capacity of flowing in excess of 10,000 cubic feet of water per second. Before the filing of the said bill of complaint, the work provided for under said contract was substantially completed, so that the said main channel through the earth sections at the time of the filing of said bill of complaint herein, had a capacity of flowing in excess of 10,000 cubic feet of water per second.

(29) The said main channel from Robey street to the controlling works at Lockport, Illinois, was completed and ready for use on or about September 21, 1898, and about January 11, 1899, pursuant to said Act of 1889, section 27 thereof, such fact was reported to the Governor of Illinois. Whereupon, the governor appointed a commission to inspect and certify the completion of the channel as required by said Act. Pursuant to the report of said commission given the Governor of Illinois, he authorized and directed the opening of said channel.

(30) On January 17, 1900, said channel was opened and the flow of the Chicago River, South Branch and West Fork, as far as Robey street was reversed and water was caused to flow out of Lake Michigan, through the Chicago River, the South Branch and West Fork thereof, and down the Sanitary District channel from Robey street and discharged into the DesPlaines River at Lockport and from thence into the Illinois River to the Mississippi River, and continuing to the Gulf of Mexico.

(31) Contemporaneously with the construction of the main channel, defendant carried on certain construction work in the Chicago River, the South Branch thereof and its West Fork, to provide a larger cross section to enable the Chicago River and the South Branch and the West Fork to flow an increased quantity of water. July 3, 1896, the Sanitary District having made application, obtained a permit from the Secretary of War to enlarge the cross section of the Chicago River and its branches, copies of the application and the permit being attached as Exhibits H and I, respectively. July 11, 1900, the Secretary of War granted two permits to the defendant to make further changes, alterations and improvements in the South Branch of the Chicago River. The application for said two permits, the plans accompanying the same and the permits are attached and marked respectively, J, J-1, K-1, K-2, L and L-1. Pursuant to said permits of July 3, 1896, and July 11, 1900 and other permits granted by the Secretary of War at various times, defendant improved the

Chicago River, South Branch and West Fork so that the rivers have been enlarged sufficiently to accommodate a flow of water of at least 8,000 feet per second with a velocity not to exceed one and one quarter miles per hour. The volume of water above specified flowing through the said rivers and through the main channel of the Sanitary District, together with the 2,000 cubic feet emptying into the South Fork of the said Chicago River from the 39th Street Pumping Station will not create a current in any way injurious to navigation.

In the improvement of said Chicago River and its branches and the widening and deepening thereof and in the building of bridges, the Sanitary District has expended in excess of $10,000,000. A large part of said money was expended for the purpose of improving navigation in the said Chicago River, South Branch and West Fork. The Chicago River was thus deepened by the defendant to a depth of twenty-six feet from a depth of seventeen feet and widened to a width of 200 feet from a width of approximately one hundred feet.

The main channel or canal constructed by this defendant from Robey street to Lockport is twenty-four feet deep at all points and has a width of 162 feet. The Chicago River, South Branch and West Fork as improved by the Sanitary District and the main channel constructed by it are of sufficient capacity to enable the largest vessels, freight or passenger, traversing the Great Lakes, to pass through or into same. By virtue of the works of the defendant, the largest vessel traversing the Great Lakes can pass through said Chicago River and its branches to the city of Joilet. Since the completion of the Sanitary District main channel, the Illinois and Michigan Canal has been abandoned. The improvement of the Chicago River and its branches was in accordance with the plan of the complainant in connection with the improvement of navigation upon the said rivers.

(32) May 14, 1903, the General Assembly of Illinois passed an Act entitled "An Act in Relation to the Sanitary District

of Chicago to enlarge the corporate limits of said District and to construct dams, water wheels and other works necessary to develop and render available power arising from the water passing through its channels, and levying taxes therefor". Under this Act, the defendant extended its main channel to the City of Joilet and the work was completed about the year 1907. Certain works were also constructed and completed about the year 1907 for the development of water power at a cost of approximately $5,000,000. The amount of power being so developed is 30,000 H. P. and is worth approximately $30 per horse power per year net. The revenue obtained from said water power is used for the purpose of partially defraying the other expenses of the defendant. The operation of said hydro-electric plant and the development and sale of electrical energy does not in any way increase the amount of water caused to flow through said main channel and is incidental merely to the operation of the Sanitary District's diversion works. About the year 1910, the Sanitary District built what is known as the North Shore channel extending from Lake Michigan and Wilmette to the North Branch of the Chicago River, with a capacity of 1,000 cubic feet of water per second, which flows from Lake Michigan into and through said North Shore channel to the North Branch of the Chicago River.

(34) Under said Act of 1889, the defendant has constructed intercepting sewers and pumping stations at Lawrence avenue in the City of Chicago, and the Lake, and at 39th street, Chicago, and the Lake, by which all the sewage formerly flowing directly into Lake Michigan is diverted into the main channel aforesaid of this defendant.

In the year 1910, the defendant entered upon the construction of an adjunct or addition to its main channel at Sag, Illinois, known as the Calumet-Sag Channel, to a point on the main channel at Sag, Illinois, which channel is in course of construction, with a capacity of approximately 2,000 cubic feet of water per second. It is capable of enlargement so that it will accommodate a flow of 4,000 cubic feet of water

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per second. The Calumet Sag Channel is to drain what is called the Calumet District lying immediately south of the southern limits of Chicago and thus prevent the pollution of the drinking water supply by and through the Calumet River. The Calumet Sag Channel is also designed to furnish a certain amount of water by which to dilute sewage and drainage flowing through the main channel of the Sanitary District, and arizing in that portion of the Sanitary District tributary to the Chicago River and its branches and the main channel of this defendant.

(35) The works constructed or being constructed and the improvement made upon the Chicago River and its branches were made necessary by the Act of the General Assembly of Illinois of 1889 and Acts amendatory and supplementary thereto. They provide a complete and comprehensive system by which an outlet is provided for the territory comprised within the limits of the Sanitary District and for the drainage arising therein. Said works do and will prevent the pollution of the drinking water of the inhabitants and provide pure water for drinking and domestic purposes. Said Act of 1889 and acts amendatory and supplemental thereto were passed and adopted under the police power existing in the State for the purpose of protecting the health and lives of the people within said district and within the State of Illinois as well as persons sojourning or visiting within the limits of this defendant. Said works constructed and to be constructed provide the only method by which the sewage and drainage of the inhabitants of the Sanitary District could be diverted from Lake Michigan and a pure water supply for domestic purposes secured for such inhabitants. By virtue of the nearness of the Mississippi drainage area, and the insignificance of the so-called continental divide, it was possible to provide in the manner above set forth, an outlet for the sewage and drainage of the City of Chicago and its environs so that the water of Lake Michigan could be maintained pure and undefiled by any pollution from sewage or drainage arising within the City of Chicago, and other

cities and villages located upon the shore of Lake Michigan near the said City of Chicago. The Sanitary District and the City of Chicago have expended in and about the construction of the works and in making the improvements, the sum of $82,000,000. Of this said amount, the City of Chicago has expended approximately $6,500,000, in and about building intercepting sewers, pumping stations, etc.

(36) The said works constructed and the improvements made and the works being constructed are necessary to preserve the health and lives of the people within the Sanitary District. The Sanitary District comprises a large metropolitan district within Cook County. Attached is a map marked Exhibit M showing the territorial boundaries of the defendant within which there is located numerous cities.

(37) Congress has at various times appropriated money for improvement of navigation in the Illinois River, and for the making of surveys and investigations to determine the best method by which navigation on the Illinois and Des Plaines Rivers could be improved in connection with the main channel of the defendant heretofore constructed. The United States built in the lower Illinois River, certain dams at La Grange and Kampsville for the purpose of improving navigation in connection with and for the purpose of supplementing improvements made by the State of Illinois in constructing two dams, one at Henry, Illinois, and the other opposite Copperas Creek on said river. The dams constructed by the State and the United States were provided with locks by which vessels could pass from the level of the water created by the dam at the lock to the level below, or vice versa. During the period when the said main channel of defendant was under construction, prior thereto and since the opening of same, Congress has appropriated moneys for the purpose of making surveys and investigations for a deep waterway, extending from the terminus of the main channel of the defendant, at or near Lockport, Illinois, on the Des Plaines and Illinois Rivers to the Mississippi River and from thence to the Gulf of Mexico. All boards of engineers and

all engineer officers of the Corps of Engineers of the United States Army, who have made reports in regard to such deep waterway pursuant to congressional appropriations have recommended the improvement of the Des Plaines and Illinois Rivers to provide deep water navigation, and the plans and recommendations made by such engineers, contemplated the use of the said main channel of defendant as part of and as a link in such deep waterway, and the use of the water flowing through and contemplated to be passed through the main channel of the defendant in the Des Plaines and Illinois Rivers for the purpose of such navigation. The International Waterways Commission created by act of Congress and by an act of the Dominion of Canada by report made January 4, 1907, recommended that 10,000 cubic feet of water per second should be allowed to be diverted by the defendant from Lake Michigan. The Sanitary District constructed its main channel with a capacity of not less than 10,000 cubic feet of water per second, to comply with the plans and purposes of the United States. The United States approved said plans and purposes and the Congress of the United States cooperated with the defendant and invited the defendant to cooperate with the complainant, and joined in the improvement of the Chicago River, as has been more fully set out. The Attorney General of the United States, on December 14, 1909, caused a bill of complaint to be filed in the name of the United States against the Economy Light & Power Company, in the Circuit Court of the United States, Eastern Division, Northern District of Illinois, to enjoin the defendant, the Economy Light & Power Company, from constructing a dam in the Des Plaines River. In and by said bill of complaint, complainant further recognized the diversion and the right of defendant to divert the amount of water contemplated in and by its said works and in and by said act of May 29, 1889. Said bill of complaint in this respect, so far as it relates to said matters, is as follows:

"That in connection with the construction of said Sanitary District Canal, and in creating the system of waterways re-

sulting from the construction of said canal, said State of Illinois has caused the quantity of water flowing through said Des Plaines River below the point at which it connects with said canal to be largely increased, and that said portion of said river has been continuously since the opening of said canal, and is now, water navigable in fact and a part of the navigable waters of the United States and subject to the jurisdiction and control of the Federal Government. * * *

That in connection with and as a result of the construction of said Sanitary District Canal and the diversion of said water from Lake Michigan, said Sanitary District of Chicago, acting under authority of said State of Illinois, has largely increased the navigability of said Des Plaines River and that continuously since the opening of said canal there has been, and is, in said portion of said Des Plaines River below the point at which it connects with said canal, a body of water navigable in fact and which, by virtue of its connection with other navigable waters is to be deemed a part of the navigable waters of the United States and subject to the jurisdiction and control of said United States."

Complainant, in and by its bill of complaint in said cause, wherein the Economy Light & Power Company was defendant, based its right to an injunction enjoining the construction of the said dam upon the fact that the State of Illinois had, in and by and pursuant to the Act of May 29, 1889, created a navigable waterway in the DesPlaines River; that said navigable waterway thus created was connected with and was a part of the system of navigable waterways created by the Sanitary District of Chicago, which said waterways thus created were connected with and a part of other navigable waters of the United States.

(38) Complainant had knowledge of the passage of the Act of May 29, 1889, plans of the Sanitary District for the construction of the main channel, and the progress of construction. About the time of the opening of the Sanitary District's main channel the lake survey of the United States

under the direction of the corps of engineers of the United States Army, had determined the increments of the St. Clair, Niagara and St. Lawrence Rivers for the purpose of making estimates or calculations of the effect of the diversion of 10,000 cubic feet per second at Chicago. Said officers of the United States at said time, upon the determination of said increment, calculated the effect of said diversion to be about six inches upon the levels of the Great Lakes below Lake Superior. The United States about the same time, in providing for the improvement of the St. Mary's, St. Clair and Detroit Rivers and other channels connecting the Great Lakes with one another, fixed the reference plane for said improvements six inches lower because of the supposed effect of the said diversion upon the levels of the different lakes. The United States acquiesced in and agreed to said diversion.

If the diversion of water from Lake Michigan to the amount proposed by the Sanitary District, will have the effect of lowering the levels of the waters of the Great Lakes, except Superior, and their connecting channels, it is feasible and practicable to compensate or off set for such lowering by constructing works in the St. Clair, Detroit, Niagara and St. Lawrence Rivers, or in some or all of them. The International Waterways Commission, in its report on the regulation of Lake Erie, issued in the year 1910, recommended the building of regulating works to regulate the levels of Lake Erie and thereby raise such levels approximately one foot at low water times, the cost of which works was estimated by said commission at approximately $796,000. A more recent report of said commission on the regulation of said Lake Erie, estimates the cost of such works at approximately $3,000,000. Such regulating works would more than off-set for any alleged lowering of the levels of the Great Lakes and their connecting channels due to the Chicago diversion.

The levels of the waters of said Great Lakes and their connecting channels, have been lowered by works constructed

by the United States and by Canada, by private individuals and corporations, by and with the consent and acquiescence of the United States. The defendant is not responsible for any lowering of said levels.

(39) By consenting to the improvement of the Chicago River to accommodate the flow of water through the Sanitary District's main channel, as contemplated under the Act of 1889, by the appropriation of money for the purpose of determining the feasibility of improving waterways to connect with the navigable waterways created by this defendant, by acquiescing in and acknowledging the right to use said works and to abstract the water from Lake Michigan as proposed, solemnly asserted in the case of *United States* v. *The Economy Light & Power Company,* above referred to, by allowing this defendant to proceed with the construction of said works, with the knowledge of said complainant, without making any objection thereto, but, on the contrary, consenting to and agreeing to various improvements made necessary by virtue of the said system of works, complainant has estopped itself from making any objection to or attempting to prevent further use and continuance of said works for the purpose for which they were created. After the beginning of the construction of said works of the Sanitary District, the United States adopted the improvements contemplated and being then carried on in the Chicago River and its various branches and supplementing said improvements so being made by the defendant and inviting further improvements, itself expended approximately $1,000,000 in the improvement of the Chicago River from Rush street to the end of the West Fork.

(40) Defendant has never recognized the right of the United States in any manner to interfere with the construction, operation or use of its main channel, adjuncts or additions, or the right of the United States to determine or direct how the said main channel and its appurtenances should be operated or used, or the amount of water that should be abstracted from Lake Michigan through its various adjuncts

or channels, to carry out the purposes of said Act of May 29, 1889. Application for permits mentioned and described in the bill of complaint and in this answer, were made by reason of the close blending or association of the two governments, namely the Government of the State and of the United States. The defendant desired, if possible, to obtain the consent of the Secretary of War for the construction, operation and use of its works, but defendant never has admitted and does not admit, but on the contrary denies the right of the United States to determine the amount of water that should be caused to flow through said main channel or its adjuncts. The permit of May 8, 1899, granted to the Sanitary District the right to open the main channel and use the same for the purposes and to cause the amounts of water to flow therein as contemplated and provided for under the Act of May 29, 1889. The only condition of said permit as to limiting the amount of water to be allowed to flow through the said main channel, is the preservation of suitable conditions of navigation upon the Chicago River itself. Said condition was inserted in said permit by virtue of the fact that at that time the Chicago River had not been widened and deepened to the extent that it was proposed to be. The orders subsequently given by the Secretary of War to reduce the flow or to increase the flow of water through the Chicago River, were based entirely upon conditions of the Chicago River for the purpose of navigation. By said permit of May 8, 1899, and the subsequent orders and permits issued by the Secretary of War, the United States recognized the right of the Sanitary District to abstract water from Lake Michigan, and only limited the amount of such abstraction by the amount that the Chicago River could carry without injury to navigation thereon. Subsequently to the issuance of said permits and orders, the project for the widening and deepening of the Chicago River for a capacity of at least 8,000 cubic feet of water per second, was carried out with the consent of the Secretary of War. Before the filing of the bill of complaint herein, defendant had improved the Chicago River channel so that at least 8,000 cubic feet of water per

second could flow and was flowing into and through the said Chicago River and the South Branch and West Fork thereof, without creating a current of more than one and one quarter miles per hour and without creating a condition which would be or was injurious to navigation on said river. The condition created by the defendant in improving the Chicago River by widening and deepening it, greatly improved navigation in all respects upon said river.

(41) The water discharged into the DesPlaines River from the Sanitary District's works, flows through said Des Plaines River and empties into the Illinois River. As a result of this flow, the Illinois River has become navigable without the use of government or state dams heretofore constructed, so that the Illinois River may now be traversed by boats of a deeper draft than could have traversed the Illinois River by the use of the locks and dams constructed by the United States and by the State, namely, the Kampsville and LaGrange dams by the United States and the Henry and Copperas Creek dams by the State of Illinois. The Illinois River has become clear, which prior to the opening of the defendant's main channel was a sluggish, slow moving body of water badly polluted by sewage discharged by the City of Chicago and many towns and villages situated along it. Fish life in said river has increased rapidly and generally it has become more healthful to the people living thereon. If the flow of the Illinois River had not been increased by the waters caused to flow therein by defendant, or if the flow through the main channel of the defendant, were limited to 4,167 seconds feet, as charged that it should be, or to any amount materially less than required by said Act of May 29, 1889, it would be necessary for the cities and towns located on said Illinois and DesPlaines Rivers to expend vast sums of money in treating the sewage now discharged in the said Illinois River, in order to prevent a public nuisance.

(42) Since the opening of the defendant's main channel and the completion of the additions and adjuncts thereto, in-

cluding intercepting sewers, the health conditions in the City of Chicago and in other towns and villages located within the defendant's territorial limits have greatly improved and the death rate from water-borne diseases has greatly diminished. A pure water supply has been provided for said people. The City of Chicago is a great railroad and commercial center, and is a primal market. Many persons not residing within the limits of the Sanitary District, come each year from all parts of the United States and the world to Chicago, and remain there for various periods. Twenty-seven million people each year come into and leave the City of Chicago. In addition, there are forty-seven million persons residing without the City of Chicago, but in the suburban communities, who enter and leave Chicago each year.

(43) If the injunction prayed for is granted and defendant is obliged to limit the withdrawal of water to 4,167 seconds feet, a large portion of the moneys expended will have been lost, and the works constructed will be practically useless and of no substantial efficiency or value. The City of Chicago and other cities and towns and villages within the boundaries of the defendant, have constructed their waterways, water mains and other sewage disposal works and water supply works, upon the basis of the works of this defendant being permanant, to endure for all time, to be operated as provided by the Act of May 29, 1889, and acts amendatory and supplementary thereto. If the said flow of water through said main channel is reduced or limited to 4,167 cubic seconds feet, in order to prevent said sewage from becoming a public nuisance, it will be necessary to construct a plant or plants for the disposal of sewage by some other method or means. The construction of such plants would cost upwards of a hundred million dollars, and the annual operation of such system would cost over seven million dollars, which capitalized at five per cent, would mean a total investment or burden of two hundred and forty million. It will be necessary to construct, in connection with said disposal works, filtration works to filter all the drinking

water and water used for domestic purposes, at a cost of upwards of twenty-five million dollars, and an annual operation cost of two million dollars, making the total investment or burden, forty million dollars. The damage to the City of Chicago and other cities, towns and villages located within the boundaries of the Sanitary District, thus would amount to approximately three hundred million dollars, and the money expended for defendant's works already constructed at a cost of approximateyl eighty-two million dollars, would have been expended for no practical purpose, so far as taking care of sanitary conditions is concerned. The only method by which defendant can conveniently take care of and remove the sewage and drainage from its limits and protect the water supply of the inhabitants of Chicago and its environs, is the one laid out under the Act of May 29, 1889, and acts amendatory and supplementary thereto. The method or methods which it would be necessary for defendant to adopt if the flow of water through its main channel were limited to 4,167 seconds feet, would not accomplish the purpose now secured by defendant's works already constructed, nor would such works constructed under a plan made necessary by such limitation of flow, in any manner equal the efficiency of defendant's works.

(44) The State of Illinois under said Act of May 29, 1889, and acts amendatory and supplementary thereto, provided a comprehensive and effective method to dispose of the sewage within the boundaries of the defendant, and to provide pure drinking water for the inhabitants thereof and its floating population—to wit, the method of treating the sewage by dilution and diverting the same from Lake Michigan. Defendant is without power to provide any other method than the one set forth under the Act of May 29, 1889. If it were given power to dispose of the sewage by some other method and procure a pure water drinking supply in some other manner the constitutional limitation of the State of Illinois upon the creation of indebtedness by municipalities would prevent this defendant from providing the moneys

with which to build sewage disposal works and filtering plants to meet the conditions which would be created by said decrease of the flow of water. Defendant could not provide sufficient funds to build said works. Neither the City of Chicago nor the other cities, villages or towns within the limits of the Sanitary District, have the power to raise sufficient moneys by the sale of bonds or by taxation, to build sewage disposal works or water purification or filtration works which would be necessary to be constructed within the limits of the respective cities, towns and villages, if this defendant were compelled to limit the flow of water to 4,167 feet.

(45) If said injunction is granted and defendant is restrained as requested, it will be unable to keep the drainage water which will flow from said territory from reversing the Chicago River at various times during each year, so that the said drainage and sewage arising tributary to the Chicago River, will flow into Lake Michigan and thereby pollute the water supply of Chicago and other cities and towns within the Sanitary District's limits. At other times during the year, the river will become polluted, so that there would be thereby created an offensive condition and a public nuisance in the spread of water borne diseases, endangering the health and lives of the population of defendant and its floating population.

(46) The sewage disposal works and water filtration plants necessary to be constructed if such injunction were granted, would be, inadequate, ineffective and impracticable to provide for the disposition of the sewage aforesaid, and to provide pure drinking water for the inhabitants of said District. The purification of sewage artificially and the filtration of water polluted by sewage or an effluent arising from sewage purification work is a method for providing a water supply used only where the method provided for under the Act of 1889, to wit, the dilution method and diverting sewage and drainage from the water supply, is impossible.

Exhibit A to answer.—"An act to create sanitary districts and to remove obstructions in the DesPlaines and Illinois Rivers". Approved May 29, 1889, by the General Assembly of Illinois; in force July 1, 1889. (Vol. VIII; Rec. 92-107.)

Section 1. This section generally provides for the organization of the Sanitary District by vote of the people on petition of certain number of legal voters, which petition shall also describe the territorial limits of the Sanitary District.

Sections 2, 3, 4, 5 and 6 set forth how the trustees shall be elected, the number, salaries, proof of ordinances, orders and resolutions, and publication of appropriations.

Section 7 is as follows:

> "7. The board of trustees of any sanitary district organized under this act shall have power to provide for the drainage of such district by laying out, establishing, constructing and maintaining one or more main channels, drains, ditches, and outlets for carrying off and disposing of the drainage (including the sewage) of such district, together with such adjuncts and additions thereto as may be necessary or proper to cause such channels or outlets to accomplish the end for which they are designed in a satisfactory manner; also to make and establish docks adjacent to any navigable channel made under the provisions hereof for drainage purposes, and to lease, manage and control such docks, and also to control and dispose of any water power which may be incidentally created in the construction and use of said channels or outlets, but in no case shall said board have any power to control water after it passes beyond its channel, waterways, races or structures into a river or natural waterway or channel, or water-power or docks situated on such river or natural waterway or channel: Provided, however, nothing in this act shall be construed to abridge or prevent the State from hereafter requiring a portion of the funds derived from such water-power, dockage or wharfage to be paid into the State Treasury to be used for State purposes. Such channels or outlets may extend outside of the territory included within such sanitary district and the rights and powers of said board of trustees over the portion of such channel or outlet lying outside of such district shall be the same as those

vested in said board over that portion of such channels or outlets within the said district.

Sections 8, 9, 10 and 11 provide that the District may purchase real estate, borrow money, raise money by taxation, and let contracts for work in certain manner.

Section 12 is in part as follows:

"Provided, that no part of the taxes hereby authorized shall be used by such drainage district for the construction of permanent fixed, immovable bridges across any channel constructed under the provisions of this act; And provided further, that all bridges built across such channel shall not necessarily interfere with or obstruct the navigation of such channel, when the same becomes a navigable stream, as provided in section 24 of this act, but such bridges shall be so constructed that they can be raised, swung, or moved out of the way of vessels, tugs, boats, or other water craft navigating such channel; And provided further that nothing in this act shall be so construed as to compel said district to maintain or operate said bridges, as movable bridges, for a period of nine years from and after the time when the water has been turned into said channel pursuant to law, unless the needs of general navigation on the DesPlaines and Illinois rivers, when connected by said channel, sooner require it."

Sections 13, 14, 15 and 16 provide for special assessments, issuance of bonds and condemnation of property.

Section 17 is as follows:

"17. When it shall be necessary in making any improvements which any district is authorized by this act to make, to enter upon any public property or property held for public use, such district shall have the power so to do and may acquire the necessary right of way over such property held for public use in the same manner as is above provided for acquiring private property, and may enter upon, use, widen, deepen and improve any navigable or other waters, waterways, canal or lake: Provided, the public use thereof shall not be unnecessarily interrupted or interfered with, and that the same shall be restored to its former usefulness as soon as practicable: Provided, however, that no such district

shall occupy any portion of the Illinois and Michigan canal outside of the limits of the county in which such district is situated for the site of any such improvement, except to cross the same, and then only in such a way as not to impair the usefulness of said canal, or to the injury of the right of the State therein, and only under the direction and supervision of the canal commissioners: And, provided further, that no district shall be required to make any compensation for the use of so much of said canal as lies within the limits of the county in which said district is situated except for transportation purposes."

Sections 18, 19 and 19*a* provide certain limitations as to special assessments, and that the Sanitary District shall pay damages resulting to lands by the operation of its works including attorneys' fees of plaintiff to be assessed as part of the costs of suit.

Sections 20, 21, 22, 23, 24, 25 and 26, are as follows:

"20. Any channel or outlet constructed under the provisions of this act which shall cause the discharge of sewage into or through any river or stream beyond or without the limits of the district constructing the same shall be of sufficient size and capacity to produce a continuous flow of water of at least two hundred cubic feet per minute for each one thousand of the population of the district drained thereby, and the same shall be kept and maintained of such size and in such condition that the water thereof shall be neither offensive or injurious to the health of any of the people of this State; and before any sewage shall be discharged into such channel or outlet, all garbage, dead animals and parts thereof, and other solids shall be taken therefrom, and said district shall, at the time any sewage is turned into or through any such channel or channels, turn into said channel or channels not less than twenty thousand cubic feet of water per minute for every one hundred [fol. 181] thousand inhabitants of said district, and shall thereafter maintain the flow of such quantity of water.

"21. In case any sanitary district in this State formed under the provisions of this act shall introduce sewage into any river or stream of water, or natural or artificial water course, beyond or without the limits of such district, without conforming to the provisions of

this act, or having introduced such sewage into such water course, shall fail to comply with any of the provisions of this act, an action to enforce compliance shall be brought by the Attorney General of this State in the courts of any county wherein such water course is situated, or he may authorize the State's Attorney of any such county to commence and prosecute such action in any such county: Provided, that nothing in this section contained shall be construed to prevent the prosecution of any action or proceedings by individuals or bodies corporate or politic against such district: And, provided further, that if any individual or the authorities of any municipal corporation shall file with the Attorney General a verified statement, in writing, setting forth wherein said sanitary district has failed to comply with any of the provisions of this act, it shall be the duty of the Attorney General forthwith to file in the Supreme Court of this State a petition for mandamus, setting forth wherein said sanitary district has failed to comply with the provisions of this act, and said court shall thereupon hear and determine such cause and proceed to enforce compliance with the provisions of this act, as in other cases of mandamus.

And, in order to comply with the provisions of this act, such sanitary district is hereby authorized and empowered to levy and collect such tax, as an emergency tax, upon the taxable property of such sanitary district as may be necessary to carry into effect any order, judgment or decree of said court relating to the requisite flowage of water, capacity of the channel or outlet and the construction, maintenance and operation of movable bridges, as required by this act.

22. Nothing in this act contained shall be so construed as to constitute a contract or grant between the State of Illinois and any sanitary district formed under its provisions, or to prevent, debar or deprive the State of Illinois from, at any time in the future, altering, amending or repealing this act, or imposing any conditions, restrictions or requirements other, different or additional to any herein contained upon any sanitary district which may be formed hereunder.

23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois river such channel shall be constructed of sufficient size and capacity to produce and maintain

at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet, and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan, of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water. If the population of the district draining into such channel shall at any time exceed 1,500,000 such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines or Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed to the Desplaines river as contemplated in this section it shall be carried down the slope between Lockport and Joilet to the pool commonly known as the upper basin of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act, may correct, modify and remove obstructions in the Desplaines and Illinois rivers wherever it shall be necessary

so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel. And the canal commissioners, if they shall find at any time that an additional supply of water has been added to either of said rivers, by any drainage district or districts, to maintain a depth of not less than six feet from any dam owned by the State, to and into the first lock of the Illinois and Michigan Canal at La Salle, without the aid of any such dam, at low water, then it shall be the duty of said canal commissioners to cause such dam or dams to be removed. This act shall not be construed to authorize the injury or destruction of existing water power rights.

24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the Desplaines and Illinois rivers for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes.

25. Any district formed hereunder shall have the right to permit territory lying outside its limits and within the same county to drain into and use any channel or drain made by it, upon such payments, terms and conditions as may be mutually agreed upon, and any district formed hereunder is hereby given full power and authority to contract for the right to use any drain or channel which may be made by any other sanitary district, upon such terms as may be mutually agreed upon, and to raise the money called for by any such contract in the same way and to the same extent as such district is authorized to raise money for any other corporate purposes: Provided, that where the united flow of any sanitary districts thus co-operating shall pass into any channel constructed within the limits of the county wherein such districts are located, and which passes into the Desplaines or Illinois rivers, such united flow shall in no case and at no time be less than 20,000 cubic feet of water per minute for each one hundred thousand of the aggregate of the population of the districts co-operating: Provided, nothing in this act shall in any wise be so construed as to diminish, impair or remove any right or rights of any city, village, township or corporation, body politic or individual situated on

the Desplaines or Illinois rivers or their tributaries and within the valleys of the same to use the channel for drainage or otherwise not inconsistent with the rights of the district constructing the same as expressed in this act.

26. Whenever in any such sanitary district there shall be a city, incorported town or village, which owns a system of waterworks and supplies water from a lake or other source which will be saved and preserved from sewage pollution, by the construction of the main channel, drain, ditch or outlet herein provided for, and the turning of the sewage of such city and district therein, and there shall be in such sanitary district any territory bordering on any such city, incorporated town or village within the limits of another city, incorporated town or village, which does not own any system of waterworks, at the time of the creation of such sanitary district, then upon application by the corporate authorities of such latter named city, incorporated town or village the corporate authorities of such city, incorporated town or village having such system of waterworks shall furnish water at the boundary line between such municipalities by means of its waterworks to the corporate authorities asking for the same in such quantities as may be required to supply consumers within said territory, at no greater price or charge than it charges and collects of consumers, within its limits for water furnished through meters in like large quantities.

Section 27 provides for reporting the completion of the channel to the Governor of Illinois, the inspection of the works by a Commission to be appointed by him, and report showing that the Sanitary District had complied with the Act and thereupon the authorization by the Governor for the opening of the channel.

Here follows description of certain acts amendatory and supplementary to the original act. (Vol. VIII, pp. 107-112.)

May 13, 1901, the General Assembly passed an act, approved July 1, 1901, specifically authorizing the building of bridges over navigable streams and acquirement of right of way by condemnation for the purpose of widening and deepening any river or stream required.

May 14, 1903 the General Assembly passed an act in force July 1, 1903, Section 1 of which enlarged the District's territorial limits by adding the territory south of 87th street in the City of Chicago, known as the Calumet District, which is drained by the Calumet Sag Channel and other territory.

Sections 2, 3, 5, 6 and 8 being the pertinent sections of this Act, are as follows:

"2. The board of trustees of said sanitary District shall have the right to provide for the drainage of the additional territory added to said sanitary district by this act by laying out, establishing, constructing and maintaining one or more channels, drains, ditches and outlets for carrying off and deposing of the drainage (including the sewage) of such district, together with such adjuncts and additions thereto as may be necessary or proper to cause such channels or outlets to accomplish the end for which they are designed in a satisfactory manner and shall have the right to use what is known as the "Calumet feeder" of the Illinois and Michigan canal and lands adjacent to such feeder belonging to the State of Illinois for the site of any such channel, within the limits of the county in which such district is situated, in such manner as said district may elect, and shall also have the right to construct a channel across said Illinois and Michigan canal, without being required to restore said Illinois and Michigan canal or said feeder to its former usefulness. If by reason of said abandonment, a stagnant stream or pool of water shall remain upon the deposits of Chicago sewage, accumulated in said Illinois and Michigan Canal by reason of its years of usefulness by the city of Chicago as a sewage outlet, said sanitary district shall fill up said canal to a depth sufficient to remove said condition and prevent the spread of pestilence and disease throughout the territory in which said Illinois and Michigan Canal is abandoned; and the other powers and jurisdiction of said sanitary district of Chicago over and in connection with such added territory shall be the same as that vested in it over the territory included within the limits of said sanitary district as originally organized. Before said Calumet channel is connected with the present main sanitary channel, gates of suitable pattern for shutting off the flow of water into said Calumet channel shall be installed at or near the connection of said Calumet channel with the Calumet river and forever maintained for use in

case of an emergency, and for the protection of the property and lives of residents of the Illinois valley, and shall maintain the same proportion of dilution of sewage through such auxilliary channels as it may construct and join to its main channel as is now required by the act creating said sanitary district: Provided however, that before any such channel is constructed across said Illinois and Michigan Canal, or the navigation of said canal in any manner interfered with, said sanitary district of Chicago shall connect its present main channel from the controlling works at Lockport with the upper basin of the Illinois and Michigan Canal at Joilet by a channel of a depth of not less than ten (10) feet and a width of not less than one hundred and sixty (160) feet through its entire length, in which channel so to be constructed said sanitary district shall provide and construct a lock or locks of the size of at least twenty-two (22) feet in width by one hundred and thirty (130) feet in length between mitre sills, connecting upper and lower levels, and provide suitable protection for water craft in using said locks and channel. Said locks shall be constructed of the most approved pattern of their size, and be perfectly safe for use and be equipped with machinery to operate the same; and if only one lock is constructed it shall be provided with double gates to prevent accident, and said sanitary district shall forever maintain and operate the same. Provided, further, that said sanitary district shall furnish and provide at said lock a site of the dimensions of at least twenty by thirty feet upon which the State through the Canal Commissioners shall have the right to erect a suitable office building and keep an agent therein, and the Canal Commissioners shall have such authority in and about said lock as is necessary to enforce the rules and regulations prescribed by them pertaining to and governing navigation on the Illinois and Michigan Canal: Provided, further: That said sanitary district shall furnish, free of all expense, for the perpetual use of the Canal Commissioners, at some point in the township of Lockport to be agreed upon by the Canal Commissioners and the sanitary district trustees, a strip or parcel of land bordering upon said sanitary channel, eight hundred (800) feet in length and one hundred and thirty (130) feet in width, filling the same to a suitable depth to provide suitable roadways for approaches, whereon may be located, constructed and operated docks, shops, barns and other buildings controlled by the Canal Commissioners and used in connection with the operation of the Illinois and Michigan Canal.

3. Said sanitary district shall permit all water craft navigating or proposing to navigate said Illinois and Michigan Canal to navigate the water of all said channels of said sanitary district promptly, without delay and without payment of any tolls or lockage charges for so navigating in said channels. The rules of the United States government now in force, regulating navigation on the Chicago river shall govern navigation on the channels of said sanitary district of Chicago; Provided however, that the speed of all vessels while passing through the earth sections shall not exceed eight (8) miles per hour.

5. That the said sanitary district of Chicago is hereby authorized to construct all such dams, waterwheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now or hereafter constructed by said district.

6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy and shall be transmitted to the various cities, villages and towns within said sanitary district or adjacent to the main channel of said sanitary district and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said sanitary district; Provided, however, that it shall be the duty of said sanitary district to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said sanitary district.

8. The said sanitary district shall at the expense of said district, in all respects comply with the provisions of the acts of Congress of March 22, 1822, and March 2, 1827, as construed by the courts of last resort of the State of Illinois and of the United States, in relation to the Illinois and Michigan Canal, so far as it affects that portion of the Illinois and Michigan Canal vacated or abandoned by the terms of this act.

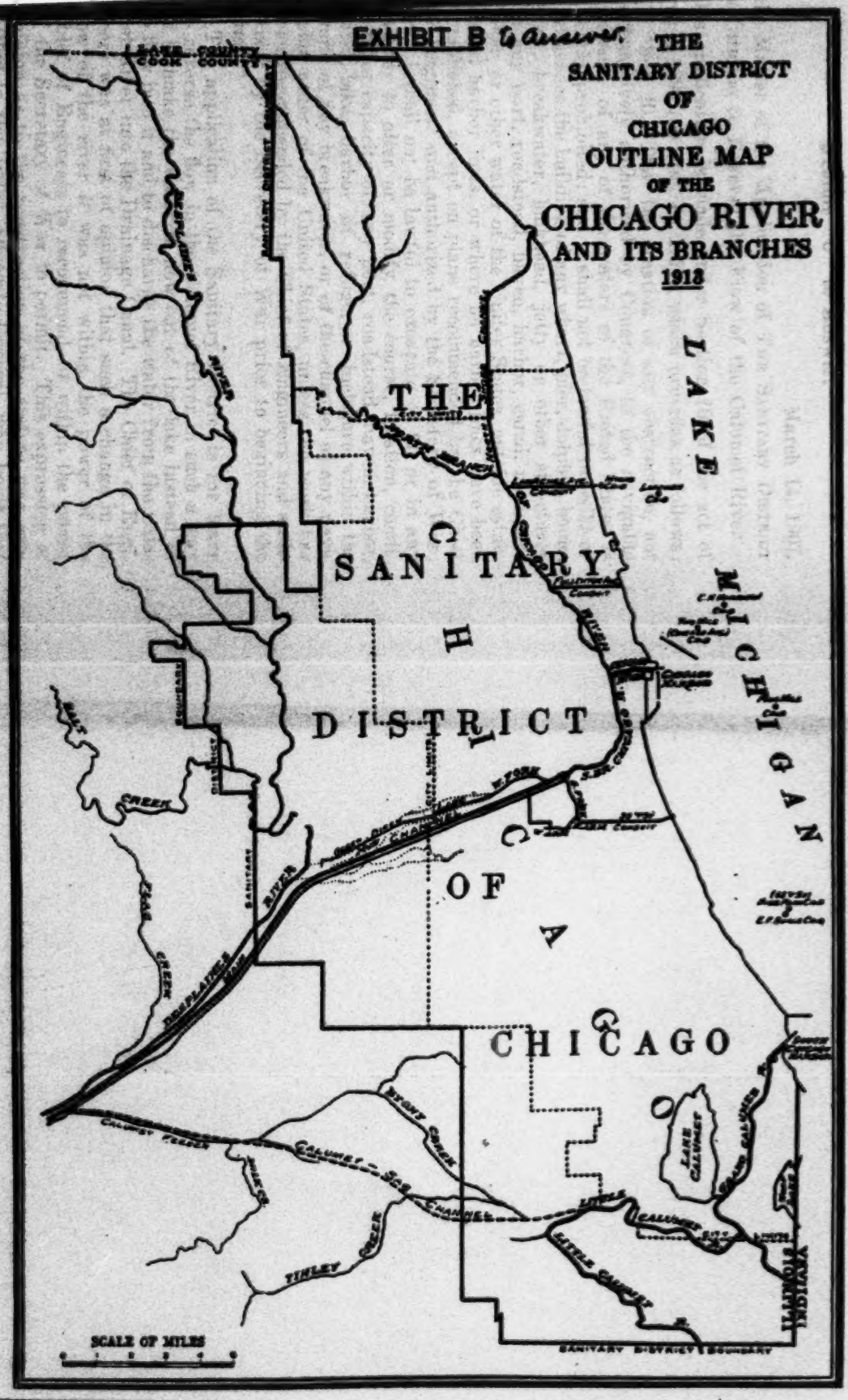

EXHIBIT B to answer
THE
SANITARY DISTRICT
OF
CHICAGO
OUTLINE MAP
OF THE
CHICAGO RIVER
AND ITS BRANCHES
1918
LAKE COUNTY
COOK COUNTY
THE
SANITARY
DISTRICT
OF
CHICAGO
LAKE
MICHIGAN
CHICAGO
SCALE OF MILES
SANITARY DISTRICT BOUNDARY

EXHIBIT B
SANITARY DISTRICT
OF
CHICAGO
OUTLINE MAP
SHOWING
CHICAGO RIVER
AND ITS BRANCHES
1913
LAKE
MICHIGAN
WISCONSIN
ILLINOIS
THE

Exhibit B page opposite.

Exhibit "C" to Answer.

March 14, 1907.

In the Matter of the Application of THE SANITARY DISTRICT OF CHICAGO to Reverse the Flow of the Calumet River

This application is made under Section 10 of the act of March 3, 1899 (30 Stat. L., 1151), which provides as follows:

> "Sec. 10. That the creation of any obstruction, not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the Unites States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

The application of the Sanitary District is for leave to reverse the flow in the Calumet River in such a way as to make the water to flow out of the lake instead of to flow into it and to discharge the water from the Calumet River into the Drainage Canal. The Chief of Engineers was at first of opinion that such a change in the flow of the river *it* was not within the power of the Chief of Engineers to recommend, or within the power of the Secretary of War to permit. This expression of opinion as to the construction of the statute was submitted to the Judge Advocate General, who holds that Section 10, as quoted above, applies to this case and and that it is one in which work could be allowed under the recommendation of the Chief of Engineers and the permission of the Secretary of War. Upon the con-

struction of the Judge Advocate General I requested the Chief of Engineers to make his recomendation, which he has done as follows:

February 23, 1907.

1. Respectfully returned to the Secretary of War.

2. The subject of the abstraction of water from Lake Michigan has been elaborately investigated by the Lake Survey Office at Detroit, and the results are published in the annual reports of the Chief of Engineers for the years 1900, 1902 and 1904. The international Waterways Commission has also given it careful consideration, and its conclusions are set forth in report of January 4, 1907, printed as War Department Document No. 293.

3. In my opinion, this abstraction will undoubtedly lower the levels of all the waters of the Great Lakes, except those of Lake Superior, and thus diminish the navigable capacity and depth of the various channels and harbors which have been deepened and improved under authority of Congress.

4. Leaving out Lake Superior, there are more than 100 works of river and harbor improvements on the Great Lakes and their connecting waters, for which appropriations aggregating more than $80,000,000 have been made. The application of this vast sum has resulted in securing and maintaining specified depths and widths of channel, which Congress has decided to be required for the accommodation of the traffic using those waters.

5. To diminish these depths even to a slight extent, would not only prove a serious injury to the traffic, but would practically undo the work which has been accomplished by Congressional direction, and necessitate the expenditure of further large sums of money for restoration. Any project that tends, in a measure, to annul or reverse the orders of Congress, as expressed in the various river and harbor acts appropriating funds for improving the harbors and channels connecting with the Great Lakes, should meet the disfavor of the Department, unless it has been sanctioned by that body. In my judgment, such a project is the one under consideration, and for this reason I am unwilling to recommend favorable action thereon, assuming that the Department is empowered to take such action, as is held by the Judge Advocate General.

A. Mackenzie, *Brig. Gen.*
Chief of Engineers, U. S. Army.

It is quite evident from the reading of the statute that the Congress intended in this statute, as in many others, to give the Chief of Engineers authority, independent of the Secretary of War, in reaching a conclusion as to the wisdom and propriety of granting a permit under the section, and that unless the Chief of Engineers shall recommend the granting of the permit, the Secretary of War is without power to give the requested authority. It follows, therefore, that the appliaction must be denied whatever my view of the case.

The decision of the Chief of Engineers and its final character has made it unnecessary for me to consider the merits of the question, but I may say this much, that the appliaction for a change in the Calumet River is to be made the basis for the withdrawal of a large amount of water from Lake Michigan and that all interested in the enormous lake traffic view the settlement of the question with grave apprehension. Added to this, is the international complication which is likely to arise in the threatened lowering of the lake level in the ports and harbors and canals of Canada. On the other hand, it is maintained with great emphasis and elaboration of detail that the change in the Calumet River, is essential to the healthful sanitation of Chicago, and that the threatened injury to navigation is so small as to be negligible.

Between two such great interests, the decision must be affected more or less by large public policy and expediency, and while I agree in the construction of the Judge Advocate General that the issue is left by statutes to the recommendation of the Chief of Engineers and the concurrent decision of the Secretary of War, it may be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States.

Wm. H. Taft, Secretary of War."

Exhibit "D" to Answer.

Permit.

"War Department,

Washington, September 11, 1907.

Sir: Referring to your letter of 2nd instant, in which you request approval of proposed drainage channel to connect Lake Michigan at Wilmette, Ill., with the North Branch of the Chicago River; also permission to con-

struct a pile crib in Lake Michigan at mouth of same, and to deposit filling within the limits of such crib, I beg to inform you that the War Department will interpose no objection to the project as set forth in your letter and indicated on drawing submitted, provided the following conditions are complied with:

1. That the pier constructions, the filling behind the same, and the excavation of the proposed channel shall be done subject to the supervision and approval of the local officer of the Corps of Engineers, U. S. Army, at Chicago, so far as to see that the work authorized is not exceeded;

2. That the total diversion of water from Lake Michigan through the Chicago River into the Illinois River shall be no greater than already authorized by past War Department permits;

3. That the work shall be commenced before December 31, 1908, and completed within five years thereafter.

Very respectfully, Robert Shaw Oliver, Acting Secretary of War. G. M. Wisner, Esq., Chief Engineer the Sanitary District of Chicago, American Trust Building, Chicago, Illinois."

Exhibit "E" to Answer.

"Permit

War Department,
Washington, June 30, 1910.

Sir: Referring to your application of the 27th instant on behalf of the Board of Trustees of The Sanitary District of Chicago to open a channel from the Calumet River to its existing Main Channel so as to substitute two routes instead of one between Lake Michigan and its canal, I have the honor to advise you to the following effect:

It appears from the records of the Department that by an instrument executed May 8, 1899, The Sanitary District of Chicago was given permission to connect its Drainage Canal with the South Branch of the Chicago River at Robey Street, in the City of Chicago, and to divert the waters of Lake Michigan through the Chicago River into said canal, subject to certain specified conditions designed to limit the amount of such diversion and in other ways to protect the public interest. The per-

mission so granted was subsequently modified at various times, and by an instrument executed December 5, 1901, the amount of flow was fixed at not exceeding 250,000 cubic feet per minute, equivalent to 4,167 cubic feet per second, which is the present rate allowed. At the time the original permit was given a connection with the Calumet River was not mentioned but if it had been it is probable that a connection with that river as well as with the Chicago River would have been allowed.

So long as the water-flow remains unchanged there seems to be no special objections to its extension to both rivers instead of confining it to a single one, especially since if the new (Calumet) route be developed later to a navigable state the double route will be advantageous to navigation interests. Accordingly, in view of the favorable recommendation of the Chief of Engineers and of the consent thereto by the Attorney General, under the conditions hereinafter prescribed, the Department hereby modifies the existing permission so as to allow the division of the already permitted water-flow in such manner as to reach the Sanitary District Canal by way of the Calumet River and a connecting channel, as well as by way of its present route through the Chicago River, subject to all pertinent conditions of the existing permissions and to other express conditions, as follows:

(a) That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of The Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

(b) That if at any time it became apparent that the current created by such drainage work in the Calumet, as well as Chicago rivers, be unreasonably obstructive to navigation, or injurious to property, the Secretary of War reserves the right to close the discharge through said channel or rivers, or to modify it to such an extent as may be demanded by navigation and property interests along said rivers.

(c) That The Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in the Calumet as well as Chicago River.

(d) That the amount of water withdrawn from Lake Michigan through the Chicago and Calumet rivers together, shall not exceed the total amount of 250,000 cubic

feet per minute (4,167 cubic feet per second) already authorized to be withdrawn through the Chicago River alone.

(e) That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

(f) That this permission shall in nowise affect or in any manner be used in the friendly suit now pending in the Circuit Court of the United States for the Northern District of Illinois brought by the United States of America against the Sanitary District of Chicago, to determine the right of the said Sanitary District to divert from Lake Michigan for sanitary purposes an amount of water in excess of that now being diverted, without having first obtained a permit from the Secretary of War.

(g) That the War Department shall have free access at all times to the waterflow records of The Sanitary District of Chicago and free access also to the regulating works and all other parts of its canals for the purpose of checking records or making water-flow measurements.

(h) That the plans for the proposed work shall be submitted to and approved by the Chief of Engineers and the Secretary of War.

(i) That the work shall be subject to the supervision and approval of the Engineers Officer of the United States Army in charge of the locality.

Very respectfully, Robert Shaw Oliver, Acting Secretary of War. Mr. George M. Wisner, Chief Engineer Sanitary District of Chicago, Chicago, Ill."

Exhibit "F" to Answer.

"Memorial to Congress on the Subject of the Illinois and Michigan Canal

(Laws Extra Session, 1826, p. 97)

To the Honorable the Senate and House of Representatives of the United States of America in Congress assembled:

The memorial of the General Assembly of the State of Illinois respectfully represents that the construction of a canal uniting the waters of Lake Michigan with the Illinois river, will form an important addition to the con-

necting links in the chain of internal navigation, which will effectually secure the indissoluble union of the confederate members of this great and powerful Republic. By the completion of this great and valuable work, the connection between the north and the south, the east and the west, would be strengthened by the ties of commercial intercourse and social neighborhood, and the union of the states might bid defiance to internal commotion, sectional jealousy and foreign invasion. All the states of the Union would then feel the most powerful motives to resist every attempt at dissolution. To effect so great and desirable an object, your memorialists believe to be of sufficient importance to engage the attention and awaken the munificent patronage of a government whose principle of action is the promotion of the general welfare. Your memorialists are sensibly alive to the spirit of improvement that manifests itself in almost every section of our extensive country, and would fain lend a helping hand in so great and good a cause; their situation, however, forbids their doing much, without the aid of the federal government; into whose treasury almost all the funds whether brought hither by emigrants or earned by the industry of their citizens, are paid for the purchase of the public lands. While this state of things shall continue and the money thus paid into the treasury of the Union is taken out of our State, our people will not be able to engage in the glorious work of improving our common country. Ought the people of this State to stand by with folded arms and behold the great work of internal improvement progress in other states without making an effort to improve their own conditions, and at the same time advance the interest of our beloved country? A condition thus paralyzed, is at war, not only with our interests, but with the best feelings of our hearts. Did this State possess the public domain lying within its bounds, as in the case with the older members of the confederacy, your memorialists would not appear before your honorable body to solicit aid in this important work. If, as your memorialists believe, the construction of this canal would be highly beneficial to the Union at large; if the receipts into the treasury of the United States would be augmented by the increased sales of public lands; and if the interest of this State would be also advanced thereby; is it unreasonable to apply to a paternal government for assistance in the promotion of such beneficial ends? It is unnecessary for your memorialists to enlarge on the great advantages of this canal to the

Union, in the facilities to be afforded in the event of a war with either the Indian tribes inhabiting our frontier, or the British nation. Your honorable body is aware that this State is situated on the borders of an Indian country, filled with numerous and powerful tribes of the sons of the forest. If our country should be again engaged in war, the saving of expense in the transportation of munitions of war, would alone defray the expense of the contemplated canal, and justify the United States in making a liberal appropriation for its construction. Your memorialists do not, however, ask your honorable body to appropriate money out of the treasury to aid them in this work; they only ask for a tract of land, through which the contemplated canal may pass, and which, for a series of years, will be wholly unproductive to the government unless the canal shall be commenced under auspices favorable to its completion; in which event all the land in the vicinity would immediately become available to the United States. Your memorialists sincerely believe that a liberal appropriation of land for this object, would, even in a pecuniary point of view be of immense importance to the treasury of the Union. The public lands in the vicinity would not only sell, but at a considerable advance upon the minimum price. Should this opinion be correct (and does not experience justify it?) the United States would be gainers by the proposed donation to the State. Your memorialists further state that at their last session, they passed an act of incorporation, upon very liberal terms, authorizing a company to construct the projected canal; but the remoteness of the country from the residence of capitalists, has prevented them from engaging in the work. At their present session, your memorialists have repealed the charter; and their only hope of soon beginning the work depends upon the liberality of your honorable body. Your memorialists have caused the route to be explored and estimates to be made of the probable expense of the work; from which it appears that the cost of constructing the canal will not be less than $600,000 and may possibly amount to $700,000. To the end, therefore, that your memorialists may be enabled to commence and complete this great and useful work, we pray your honorable body to grant to this State the respective townships of land through which the contemplated canal may pass; the avails of which to be appropriated exclusively, to the construction of said canal, upon such terms and conditions as to your honorable body may seem proper.

Exhibit "G" to Answer.

"An Ordinance for Cleansing the Chicago River and Appropriating the Proceeds of Two Hundred and Fifty Bonds Therefor.

Section 1. Be it ordained by the Common Council of the City of Chicago (June 5, 1865), That the plan of the board of public works for cleansing the Chicago River and its branches by cutting down the summit of the Illinois and Michigan Canal below the level of Lake Michigan so as to draw from it at a low stage of water in the lake not less than twenty-four thousand (24,000) cubic feet of water per minute, is hereby approved, and said board are hereby authorized to execute said work.

Section 2. That the board of public works are hereby authorized and empowered for the purpose of prosecuting the work described in the previous section, to make any contract necessary to carry into effect such purpose with the trustees of the Illinois and Michigan Canal, in conformity with and subject to the general provisions of the city charter.

Section 3. That as a temporary expedient for cleansing the South Branch of the Chicago River, the said board are hereby authorized and empowered to contract with the said trustees for the pumping from the river into the canal, by the hydraulic works at Bridgeport, and discharging through the canal of such amount of water as shall be found necessary and practical for such purpose.

Section 4. That for the purpose of carrying out the improvement specified in the foregoing sections, the board of public works be and they are hereby authorized to issue 250 bonds of the denomination of $1,000 each, to be dated July 1, 1865, and payable in New York, twenty-five years after the date thereof, with coupons for interest, at the rate of seven per centum per annum, payable semi-annually in New York; the said bonds to be issued in conformity with the provisions of an act of the General Assembly of the State of Illinois, approved February 15, 1865, and entitled 'An act to amend an act entitled an act to reduce the charter of the City of Chicago, and the several acts amendatory thereof, into one act, and to revise the same,' approved February 13, 1863."

Exhibit "H" to Answer.

Application of the Sanitary District for the Improvement of the Chicago River.

Chicago, June 16, 1896.

To the Honorable Daniel S. Lamont, Secretary of War, Washington, D. C.

Dear Sir: The work of The Sanitary District of Chicago has progressed so far that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey Street, Chicago, to Lockport in Will County, twenty-eight miles distant.

Our connection with Lake Michigan must be through the Chicago river with the West Fork of the South Branch of which we make a junction at Robey Street. We send herewith a map showing in a general way our plans for improving the Chicago River by widening and deepening at the points indicated thereon by red hatchings and by figures which refer to explanation, given in the legend on the map. It is desired to so correct and regularize the cross section of the river as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of one and one-quarter miles per hour. The cross section necessary to accomplish this can be obtained throughout the greater part of the distance between Monroe Street and Robey Street, by dredging the river to a depth of 20 ft. at mid stream, with 12 ft. at dock lines and a uniform slope away from docks of one foot in five, so that the full depth would be reached forty feet from the dock lines; but there are places so narrow that this cross section can only be obtained by widening the river; and again the depth to be obtained in the vicinity of Van Buren Street is limited by the height of the crown of the tunnel. To obviate this difficulty it is purposed to secure the requisite cross section by constructing a by-pass to the west of the bridges at Adams, Jackson and Van Buren Streets, as indicated. We ask your permission to proceed with the work upon the lines indicated and so far as is consistent with propriety the co-operation of the United States Engineering Department.

Awaiting your favorable reply, and holding ourselves ready to respond to any call from you for fuller information as to our plans, I am (map opposite, Exhibit H)

Yours respectfully, (Signed) B. A. Eckhart, President.

EXHIBIT H To Answer

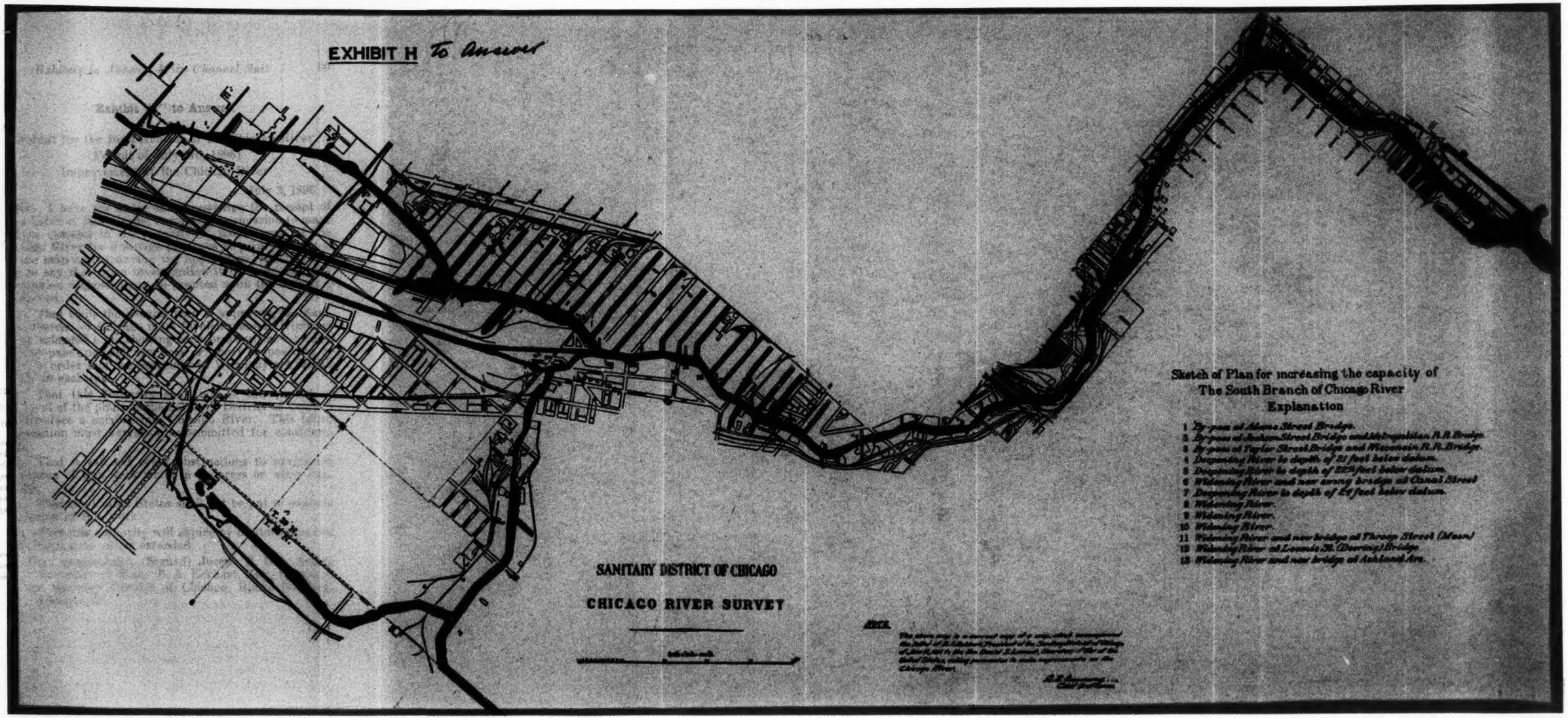


Exhibit "I" to Answer.

Permit for the Improvement of the Chicago River
(Permit of July 3rd, 1896)
Improvement of the Chicago River

July 3, 1896.

Sir: I have the honor to acknowledge the receipt of your letter of 16th ultimo, requesting permission to make certain changes in the capacity of the channel of the Chicago River for drainage purposes at points indicated on the map accompanying the application, and in reply beg to say that upon investigation it is found that the permission requested can be granted upon the following conditions:

1. That while the general plan is approved, the Sanitary District of Chicago must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass and each new dock or wharf proposed to be built, in order that the Secretary of War may act intelligently in each case.

2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must hereafter be submitted for consideration.

3. That it will not cover obstructions to navigation by reason of this work while in progress or when completed.

4. That the United States shall not be put to expense by reason of this work.

5. That this authority will expire by limitation in two years from date unless extended.

Very respectfully, (Signed) Joseph B. Doe, Acting Secretary of War. B. A. Eckhart, Esq., President the Sanitary District of Chicago, Rialto Building, Chicago, Ill.

Exhibit "J" to Answer.

Security Building
The Sanitary District of Chicago

Chicago, April 26, 1900.

To the Honorable the Secretary of War.

Sir: The Sanitary District of Chicago, a municipal corporation organized and existing under the laws of the State of Illinois, respectfully represents that, by the laws of the State of Illinois and the charter of this petitioner, it is authorized to enter upon, widen, deepen and otherwise improve any navigable stream, river or other waterway. That in pursuance of the power conferred upon it by the statutes of the State of Illinois, and in the performance of the duties enjoined upon it by the act of the Legislature authorizing its creation, and under which it is acting, it has been determined to improve the Chicago River by widening and deepening the same and to the end that such action on the part of your petitioner may be conformable to law and the statutes of the United States in that behalf, it hereby makes application for permission to make the changes, alterations and improvements in said Chicago River from or near Lake Street in the City of Chicago to or near Ashland Avenue in the City of Chicago, said work to conform to the plan and specifications as follows:

(a) A map herewith exhibits the existing boundaries of that part of the South Branch of the Chicago River which it purposes and desires to improve.

(b) The work to be done contemplates widening the river to a width of two hundred (200) feet between dock lines, except in so far as bridge abutments may project into the stream outside of the new dock lines; said widening in all cases to be made with a view of improving the navigability of the stream.

(c) The work to be so done as to ultimately permit excavation of the river bed to a depth of thirty (30) feet below water surface throughout the central portion of the stream.

(d) The widening of the river is to be so disposed that the effect will be to produce a straighter channel than now exists and, furthermore, to result in a continuous dock line having straighter alignment and being better

disposed for navigation than the docks which now exist.

(e) The work to be done is to be prosecuted progressively as to time. The rate of progress being limited by the rapidity with which right of way may be acquired and the resources for the execution of the work to be made available. The modification and alteration of said river as above indicated will greatly benefit navigation in said river. Your petitioner, therefore, respectfully requests that the plan of improvement as above outlined be approved by you.

Awaiting as early a reply as practicable under the circumstances, your petitioner has the honor, to be.

Very respectfully yours, The Sanitary District of Chicago, by William Boldenweck, President. Attest: Joseph H. Haas, Clerk.

Exhibit "J-1" to Answer.

Chicago, June 7, 1900.

To the Honorable, the Secretary of War.

Sir: Under date of April 26, 1900, the Sanitary District of Chicago had the honor to address a communication to you containing an outline of the proposed improvement of a portion of the South Branch of the Chicago River. Accompanying the letter was a map showing the location of the South Branch of the Chicago River, the bridges spanning said river and, also, the width of the stream along the entire course of the South Branch of the river. Since that date the Sanitary District of Chicago passed an ordinance for the improvement of the South Branch of the Chicago River from the south line of Twelfth Street to the east line of Ashland Avenue, so as to make said South Branch, between the lines aforesaid, of a uniform width of two hundred (200) feet; the work to be done so as to ultimately permit excavation of the river bed to a depth of thirty (30) feet below water surface throughout the central of said stream, in accordance with the plans adopted by the Board of Trustees of the Sanitary District of Chicago, a copy of which plans is hereto annexed. The ordinance refered to being marked Exhibit "A," with this letter; and the maps showing the plans of the proposed improvement being marked Exhibit "B." The maps are in two sections, known respectively as No. 2 and No. 3.

The Sanitary District of Chicago is a municipal corporation, organized and existing under the laws of the State of Illinois and by the laws of said State and the charter of said Sanitary District, it is authorized to enter upon, deepen, widen and otherwise improve any navigable stream, river, or other water-way; and that in pursuance of the power conferred upon it by the statutes of the State of Illinois and in performance of the duties enjoyed upon it by the act of the legislature authorizing its creation, and under which it is acting, it determined upon said plans outlined in the enclosed ordinance and further illustrated by the maps hereto annexed; and the said Sanitary District, in compliance with the Statutes of the United States, hereby makes application to you for permission to make the changes, alterations and improvements in said South Branch of the Chicago River, from the south line of Twelfth Street to the east line of Ashland Avenue.

Awaiting as early a reply as practicable under the circumstances, your petitioner has the honor to be,

Very respectfully yours, The Sanitary District of Chicago, by William Boldenweck, President. Attest: Joseph F. Haas, Clerk. (Exhibits K1, K2, page opposite.)

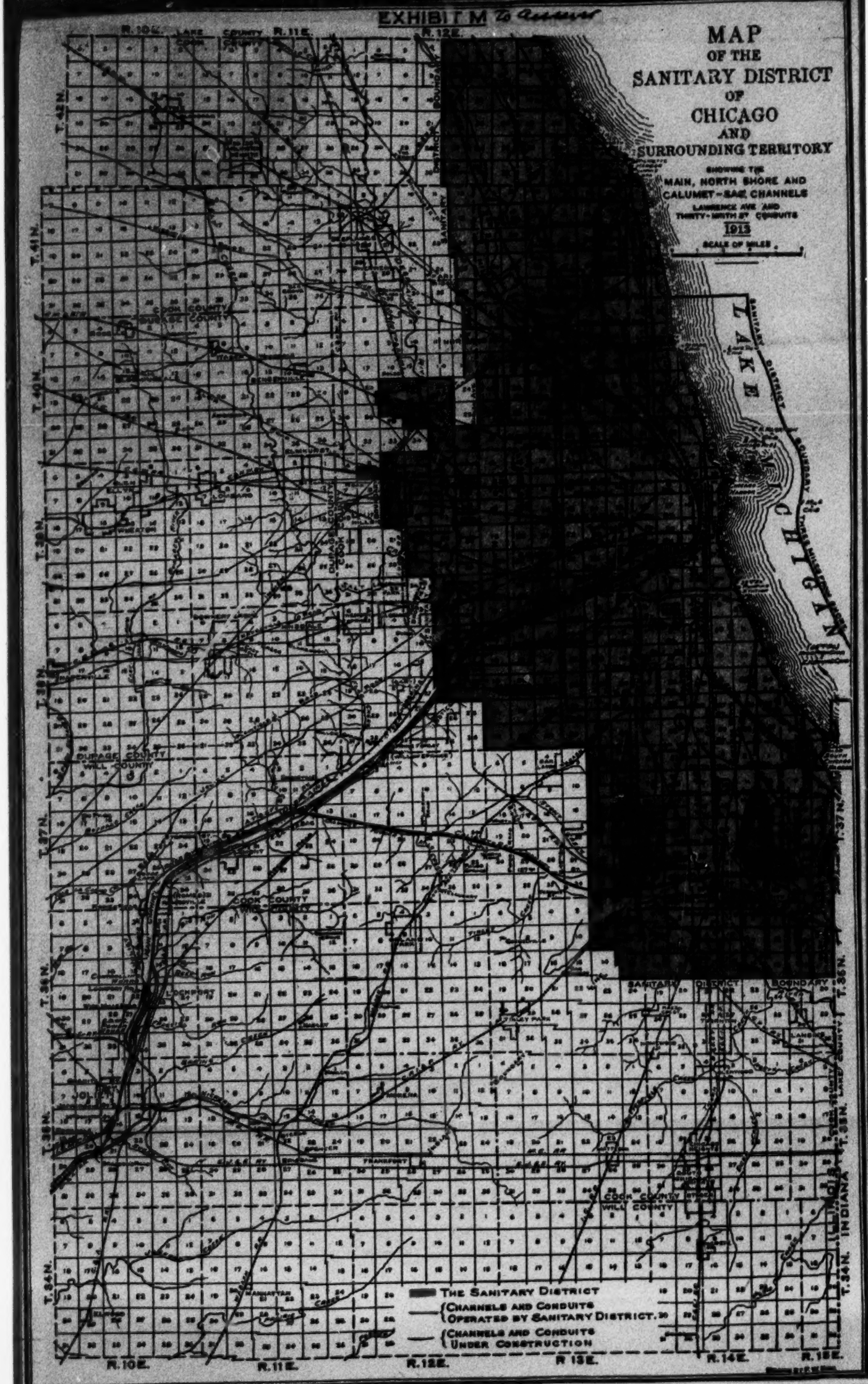
Exhibit "L" to Answer.

War Department,
Washington, July 11, 1900.

Sir: I have the honor to acknowledge the receipt of your letter of April 26th last, requesting, in behalf of the Sanitary District of Chicago, permission to change, alter and improve the Chicago River, from Lake Street to Ashland Avenue, in Chicago, as shown on maps which accompanied your said letter.

Replying thereto I beg to inform you that there is no objection on the part of the War Department to the prosecution of work of improvement of Chicago River, specified in the above mentioned letter and delineated on the maps which accompanied the same, it being understood that this statement as to the attitude of the War Department shall not be understood as involving the general government in any way with the expense incident to the carrying out of the project, and does not in any way in-

EXHIBIT M to Answer



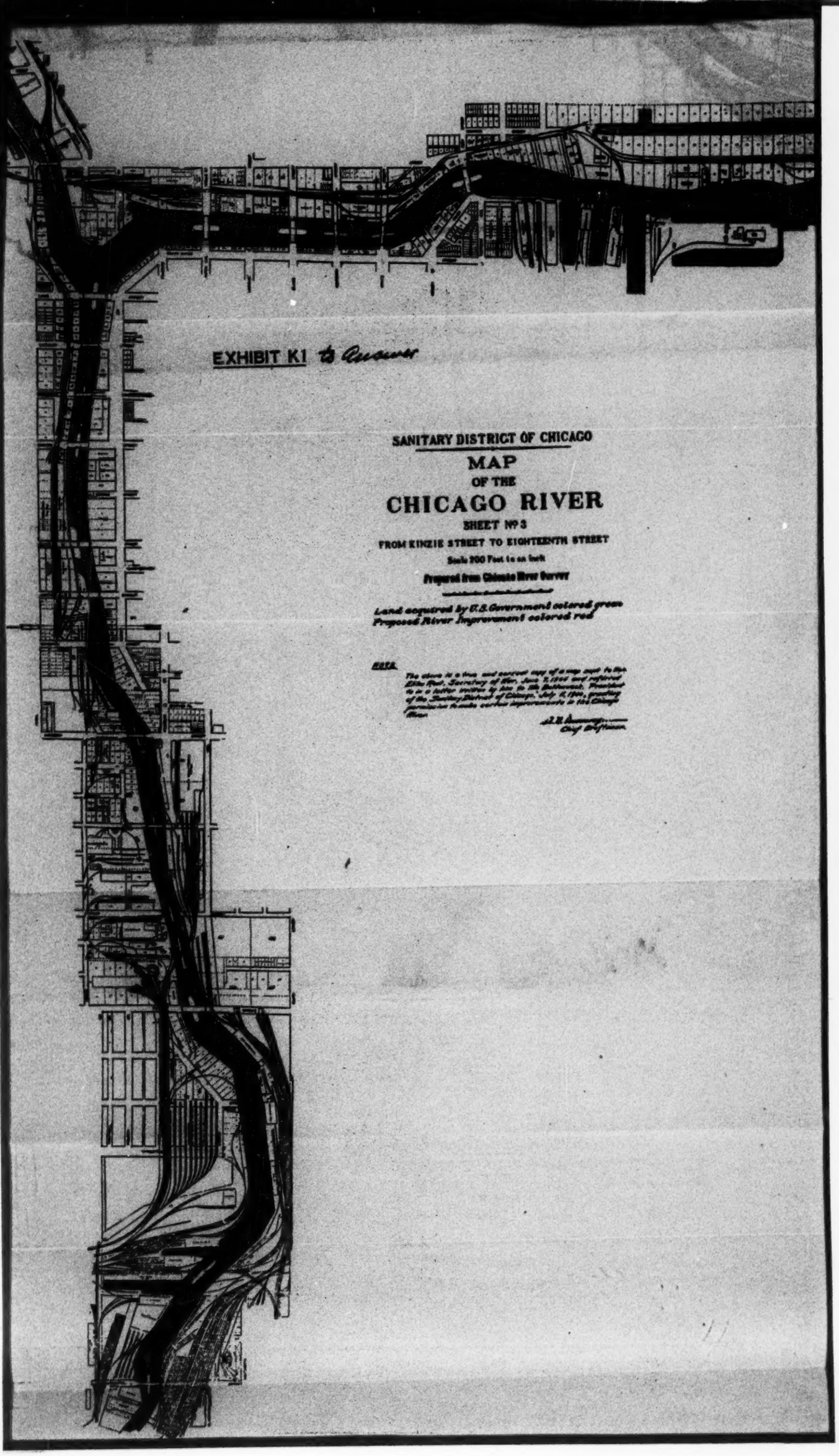


EXHIBIT K1 to Answer

SANITARY DISTRICT OF CHICAGO

MAP
OF THE
CHICAGO RIVER

SHEET № 3

FROM KINZIE STREET TO EIGHTEENTH STREET

Scale 200 Feet to an Inch

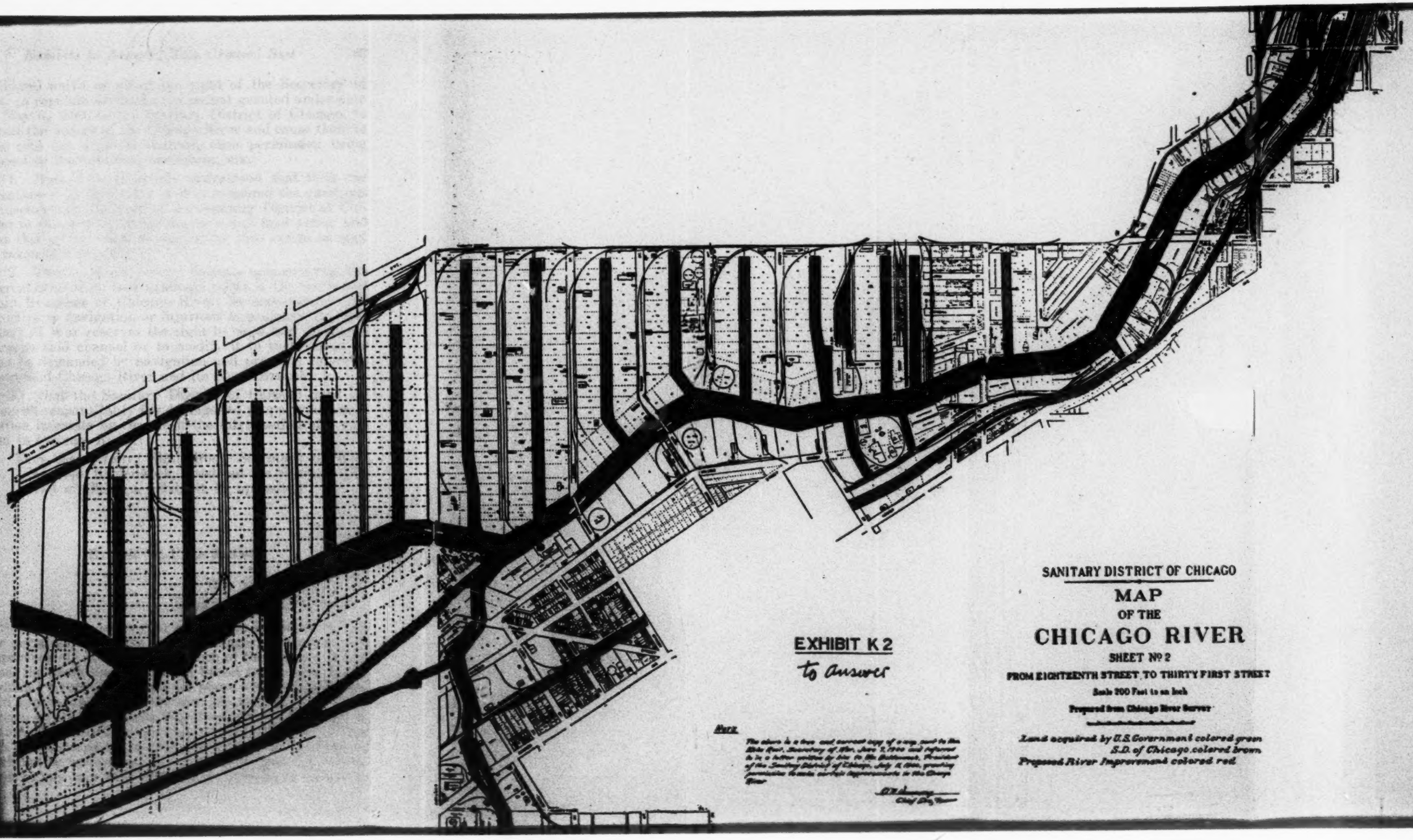
Prepared from Chicago River Survey

Land acquired by U.S. Government colored green
Proposed River Improvement colored red

[illegible]

The above is a true and correct copy of a map sent to the Hon. Secretary of War, June 7, 1911 and referred to in a letter written by him to the Metropolitan President of the Sanitary District of Chicago, July 8, 1911, granting permission to make certain improvements in the Chicago River.

[illegible]
Chief Engineer



SANITARY DISTRICT OF CHICAGO

MAP

OF THE

CHICAGO RIVER

SHEET No 2

FROM EIGHTEENTH STREET TO THIRTY FIRST STREET

Scale 200 Feet to an Inch

Prepared from Chicago River Survey

Land acquired by U.S. Government colored green
S.D. of Chicago colored brown
Proposed River Improvement colored red

EXHIBIT K 2

to answer

NOTE

The above is a true and correct copy of a map, sent to the State Dept. Secretary of War, June 2, 1910 and referred to in a letter written by Asst. Sec. Ellis Bothwick, President of the Sanitary District of Chicago, July 6, 1910, granting permission to make certain improvements in the Chicago River

[illegible]
Chief Eng. Officer

validate, waive or affect the right of the Secretary of War to regulate or revoke the permit granted under date of May 8, 1899, to the Sanitary District of Chicago, to divert the waters of the Chicago River and cause them to flow into the artificial channel, such permission being subject to the following conditions, viz:

"1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action and that this permit shall be subject to such action as may be taken by Congress.

"2. That if, at any time, it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"3. That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago River.

Very respectfully, Elihu Root, Secretary of War.
Mr. Wm. Boldenweck, President the Sanitary District of Chicago. (Exhibit M, opposite.)

Exhibit "L-1" to Answer

War Department,
Washington, July 11, 1900.

SIR: In response to your application of the 7th ultimo, for permission to make certain changes, alterations and improvements in the South Branch of the Chicago River, from the south line of Twelfth Street to the east line of Ashland Avenue, as shown on plans which accompanied said application, I beg to inform you that there is no objection on the part of the War Department to the prosecution of the work as specified, it being understood that this statement as to the attitude of the War Department shall not be understood as involving the general government in any way with the expense incident to the carry-

ing out of the project, and does not in any way invalidate, waive or affect the right of the Secretary of War to regulate or revoke the permit granted, under date of May 8, 1899, to the Sanitary District of Chicago, to divert the waters of the Chicago River and cause them to flow into the artificial channel such permission being subject to the following conditions, viz:

"1. That it be distinctly understood that it is the intention of the Secretary of War to submit the question connected with the work of the Sanitary District of Chicago to Congress for consideration and final action and that this permit shall be subject to such action as may be taken by Congress.

"2. That if, at any time, it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"3. That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interest by reason of the introduction of a current in Chicago River.

Very respectfully, Elihu Root, Secretary of War.
Mr. Wm. Boldenweck, President The Sanitary District of Chicago, Security Building, Chicago, Ill.

OPINIONS, ORDERS AND ASSIGNMENT OF ERRORS.

Between the filing of the Bill of Complaint in the Calumet suit, March 23, 1908, and December, 1914, and on April 25 and 26, 1923, evidence was offered by both parties before a Commissioner appointed by the Court upon the various issues involved in the pleadings. It was stipulated that evidence offered in either suit by either party, material or relevant to the issues in the other suit should be treated as if offered and presented in such suit. By agreement, the causes were submitted upon the evidence which was printed and upon printed briefs and arguments on behalf of

both parties to Honorable Kenesaw Mountain Landis, one of the Judges of the District Court of the United States for the Northern District of Illinois, Eastern Division, February 15, 1915. The evidence will be hereafter described and narrated. June 19, 1920, Judge Landis having called the attorneys for both parties together, delivered an oral opinion, announcement or direction for decree. A stenographic transcript of this opinion appears in the certificate of evidence filed June 29, 1923, after the order of injunction in said cases was entered. The oral opinion is as follows (Vol. VIII, pp. 149-152):

OPINION OF JUDGE LANDIS IN SANITARY DISTRICT CASES.

June 19, 1920.

"I have sent for you gentlemen to dispose of the Sanitary District cases. Before taking up these cases, just a word about time and delay. Six years was spent after these cases were filed in taking testimony, and about six years has passed since the cases were submitted to me on briefs. The six years that was taken up while taking testimony was all necessary. The delay that has occurred since the matters have been submitted to me have been the result of the exercise of my judgment. First, that during the war period, in view of the international questions possible, I thought it was better that this matter should continue just as it was, and secondly, since the war I have deferred entering this order with the understanding that there was a possibility of a composition of differences here that would enable the questions to be permanently adjusted along lines which I have been told were suggested by the Sanitary District to the War Department and the Canadian Government. I have held the matter, however, as long as I think proper on that theory and shall enter an order.

The bills were filed under legislation authorizing the United States to receive the injunctive power of the court as against obstruction of navigable waters and impairment of the navigable capacity of navigable waters. The averments, so far as I need to deal with the averments here now, are that the Sanitary District proposes to take an amount of water—is taking an amount of water—proposing to take more, the taking of which will result in such impairment and such obstruction. Specific-

ally, the impairment complained of most important in my view, is the impairment of the navigable capacity of the Great Lakes, excepting Lake Superior. The theory of the bills is—the charge is that such impairment by the district as is charged in the bills, without the consent of the Federal authorities at Washington, which consent is authorized and provided for by the Federal legislation, as I said before, entitles the government to an injunction. The defense of the Sanitary District is, first, that there is no impairment and no obstruction, and primarily, secondly, if there is an impairment or an obstruction, that it is necessary for the sanitation of this great populative territory. An examination of the proofs on the question of whether there is an impairment or not, an obstruction or not, that is to say, whether the taking of this water is felt or not, leads me to the conclusion that there is a lowering of the surface of this lake. In making that statement I have in mind the variation of the lake levels, traditional variation of the lake levels, known to all men that know anything about it. All that time finding that there is a lowering of the lake level, yes. That the taking of this vast volume of water each minute of each hour of each day of each month of each year continued unceasingly, no evidence in this case discrediting the fact, and has entirely resulted in the lowering of the level of the lake, and has resulted in changing the current of the Chicago River and reversing the current of the Chicago River. Now that the variation is only a matter of inches in the level of Lake Michigan, it is without doubt in my judgment, on the evidence in the matter, a matter of inches, and being a matter of inches, even though it be no more than three or four, having in mind the state of proof as to the depth of the harbors in the Great Lakes, it is directly an impairment of navigable capacity, and by leaving the bottom of the harbors that much closer, the water is the creation of an obstruction to the navigable waters of the United States; in other words, the question of fact—whether there is an impairment or obstruction here, are beyond controversy and beyond question, but the fact is clearly established that there is such a change in this lake level, in my judgment, so that in low lake level time the level is lower and in high lake level time it is less than it would be but for this diversion.

Q. How many cubic feet per minute now?

A. Just at present I think about 8,500 per second. 480,000 cubic feet per minute, that is approximately.

The diversion is 480,000 cubic feet per minute. The finding of the court is, on the evidence in this case, that that has resulted in the lowering of the lake level and the reversal of these currents, which latter fact is not controverted, and on the evidence in the case that the lowering is an impairment, as I said before, an impairment of navigable capacity, even though it amounts to no more than three or four inches, and as to the lowering to that extent there could be no controversy on the record, so on that fact the court's finding is against the contention of the defendant on the proposition that this is a necessary thing for the salvation of this community, that is, without this water this community will be at the mercy of diseases and germs from which it suffered before this diversion began and from which it has by this diversion been practically relieved of, as shown by statistics. The court has complied with the rule of law, that navigable rights are paramount, and even though the district is driven to the necessity of making some other provision, granting that the War Department and Congress should refuse to give that contention to this question of sanitation, it is entitled to the law which is in force in this room on me, which I must obey, that a navigable right is paramount, and that in the last analysis should Congress and the War Department in consideration of all these matters decline to permit the necessary diversion, the burden is on the District of providing some other method of relief; in other words, the defense that is necessary for the purposes of sanitation as against the rule that a navigable right and navigation right is a paramount right, is immaterial.

I had hoped, as I stated at the beginning, that there might be a composition of this thing. The Judge has no right to have personal feelings, but I live in this community, and it was my hope that there could be devised a program that would enable this district to have the benefit of this water, as much as it needs, that will give to the country this water in the solving of this problem of navigation.

There will be an order striking or sustaining the exceptions of the plaintiff, certain paragraphs of your answer setting up this sanitation defense. There will also be another sustaining the operation of this order which I am entering here this morning until 30 days after the Sanitary District has an opportunity to present to the Supreme Court of the United States an application for a supersedeas against high water, that is 30 days after

the date fixed for the meeting of the Supreme Court in October. The order will not go into effect, it will be suspended until 30 days after the Supreme Court meets in October. That is plenty of time, is it not? A. Yes, sir. I think that is plenty of time. I have considered that is enough. I wanted to make no mistake. You can form it in a way so that you will have a final order to appeal from. You have got to have that in mind. You may draw an order effective 30 days after the Supreme Court meets.

I omitted to mention one matter here which is not important, except the control of the Federal Government over this question has been recognized from the beginning by the Sanitary District itself before the diversion began and continuously down until what was that year when they attached that order, 1909? A. I think 1907 or 1908.

From the beginning, prior to the beginning of the diversion and down to 1907 or 1908, the constant attitude of the Sanitary District was a recognition of the control of the Federal Government over this whole question, everything that was done by the Sanitary District in the way of diversion being in a permit granted by the War Department on application of the Sanitary District to that end. The Sanitary District shall have an opportunity to apply for further relief to the War Department at Washington. Under no circumstances does this order go into effect now. Make that 60 days, and you may put in it, if it does not destroy the appealability of the order, you may put in a provision retaining me in control. The thing that the Government wants, at least the court wants, being a citizen of Chicago, the thing I want is water without microbes. That is why I have held your lawsuit."

July 12, 1920, subsequent to Judge Landis' delivering the opinion as aforesaid, the Sanitary District presented a motion entitled

"Motion for Reconsideration of Oral Opinion and Oral direction of the Court concerning the form of decree in said two causes, together with grounds of said motion." The Motion is in part, as follows (Vol. VIII, pp. 152-167):

"Now comes The Sanitary District of Chicago, defendant, in said two causes, by C. Arch Williams and

Edmund D. Adcock, its attorneys, and moves the court that it reconsider its oral opinion and oral direction heretofore announced concerning the form of decree to be entered in the said causes, and that the court direct that The Sanitary District of Chicago, defendant, be enjoined, only, from withdrawing or diverting from Lake Michigan, through its various works now constructed or under construction, more than ten thousand cubic feet of water per second from Lake Michigan on condition that if the Congress of the United States, or other competent governmental authority, provides for the construction of, in the St. Clair, Niagara or St. Lawrence Rivers, or in one or all of them, works to compensate for any diminishing levels of the Great Lakes and connecting waters, due to the diversion or withdrawal of ten thousand cubic feet of water per second from Lake Michigan by The Sanitary District of Chicago, then The Sanitary District of Chicago shall defray the expense and pay the cost of the construction and maintenance of any such works upon request therefor by the United States of America. In connection with said motion, and as a part thereof, the defendant hereby offers and agrees to defray the expense or pay to the United States upon demand the cost of the construction and maintenance of the works of the character above described in accordance with an ordinance of the Board of Trustees of The Sanitary District of Chicago passed and approved by said Board on the 8th day of July, A. D. 1920, a copy of which said ordinance is hereto attached and marked Exhibit "A," a certified copy of which is here ready to be produced in court. In support of said motion, and as grounds therefor, the defendant alleges and shows the following:"

As grounds for the said motion, the defendant recited the institution of the suits, the purpose of the complaint in the main channel suit filed October 6, 1913, and that the ground for the injunction sought was that the diversion of water would lower the levels of the Great Lakes and connecting waters, thereby injuring navigation and changing the navigable capacity of such navigable waters of the United States.

3. It is further set forth that it is an admitted and undisputed fact on the record in said causes that works may be installed in the St. Clair, Niagara and St. Lawrence Rivers,

which will compensate for the lowering of the lake levels due to diversion at Chicago of 10,000 cubic feet per second.

A portion of the River and Harbors Act of June 25, 1910, was set forth as follows:

> "The Secretary of War shall appoint a board of five members, to be composed of four engineer officers of the army and one civil engineer, taken from civil life. * * * Said Board shall report upon * * * such measures as may be required to properly preserve the levels of the Great Lakes and to compensate, as far as practicable for the diminishing level in said lakes and the connecting waters thereof by reason of any diversion of water from Lake Michigan for the maintenance of the proposed waterway herein described, or diversion for any other purpose."

The motion further stated:

> "The Board of Engineers, provided for by said Act of Congress, so appointed, made an investigation and its report was submitted to the Board of Engineers for Rivers and Harbors on August 15, 1913. The Board of Engineers for Rivers and Harbors report, reviewing the report of the special board, is dated December 16, 1913. It is signed by General William M. Black, then senior member of the Board, who was later and for a number of years Chief of Engineers of the United States army. Concerning the Chicago diversion, the Board of Engineers for Rivers and Harbors, in its report stated:
>
> 'Further, the Board believes that the total volume of water to be diverted from the natural discharge channels of the lakes should be definitely fixed by Congress; that a project with estimate of cost for works necessary to compensate for such diversion should be prepared to the satisfaction of the Chief of Engineers, and the Secretary of War; that before any diversion is made beyond that at present existing, the State of Illinois shall transfer to the Secretary of War the funds necessary for such works as given by approved estimate of cost that the work shall be built by the United States with the funds so provided and that the control and maintenance of such works shall be in and at the cost of the United States.'
>
> The Special Board's report upon the subject of compensating for diminished or diminishing lake levels is as follows:

'To restore the diminished levels in the lakes by constructing contracting works in their outlets does not, however, present any serious difficulties. A careful discussion of the proper locations and dimensions of such works is also given in Appendix A.

At the foot of Lake Ontario the closure of the Gut channel of the Galops Rapids by the Canadian Government has had the effect of raising the level of Lake Ontario an amount nearly equal to the computed lowering of the lake by a diversion of 10,000 second feet at Chicago, and no compensation is at present deemed necessary to restore former conditions in this lake.

In Appendix A it is proposed to diminish the outflow of Lake Erie by the construction of three submerged weirs in Niagara River in the vicinity of Squaw Island, which would average about 4.2 feet in height and would contain about 15,000 cubic yards of masonry. The estimated cost is $150,000.

To raise the level of Lakes Michigan and Huron submerged weirs are proposed in St. Clair River, covering 3 miles of river below the mouth of Black River at Port Huron. The weirs as suggested in Appendix A have a height of from 5 to 6 feet above the river bed, contain about 65,000 cubic yards of material, and their estimated cost is $325,000. It is computed that these weirs will increase the velocity of the water flowing over them slightly (from a mean of 3.28 feet to 3.89 feet per second), but, on the other hand, above the mouth of Black River the river slopes and velocities which are now excessive will be diminished, and navigation on the whole will be considerably benefited.

The Chicago diversion has no effect on Lake Superior.

Compensation for the loss of elevation on Lakes Michigan, Huron and Erie, and their connecting waters, due to an assumed diversion from Lake Michigan of 10,000 second feet, will by the plan above outlined involve an expenditure of about $475,000, to which should be added an amount for the maintenance of the weirs, estimated at about $15,000 per year, the total cost being much less than the cost of restoration of depths by dredging. It is the opinion of the board that while other plans have been proposed compensation by fixed contraction works similar in general to those above described affords the cheapest and most satisfactory method of preserving the levels of the Great Lakes.'

Said report is signed by W. H. Bixby, Brigadier General, U. S. Army, retired, President of the Board; C. McD. Townsend, Colonel, Corps of Engineers, U. S. Army; C. Keller, Major, Corps of Engineers, U. S. Army; J. B. Cavanaugh, Major, Corps of Engineers, U. S. Army; and John Bogart, Civil Engineer.

* * *

4. On June 30, 1917, the Congress of the United States by joint resolution authorized and directed the Secretary of War to

"Make a comprehensive and thorough investigation, including all necessary surveys and maps, of the entire subject of water diversion from the Great Lakes and Niagara River, including navigation, sanitary and power purposes, and the preservation of the scenic beauty of Niagara Falls and the rapids of Niagara River, and to report to Congress thereon at the earliest practicable date."

Accordingly, the Chief of Engineers, by direction of the Secretary of War, authorized the Division Engineer, Lakes Division (Col. J. G. Warren, Corps of Engineers, U. S. Army), to make and prepare a report upon all the diversions of the Great Lakes. This report was recently submitted to the Board of Engineers on Rivers and Harbors, and, on June 3, 1920, * * * The said report found that there were many diversions of the waters of the Great Lakes which effected the lowering of lake levels, and particularly the level of Lake Erie—such as the diversions at Niagara for power purposes, the diversion of 4,500 cubic-seconds feet for power purposes through the Welland Canal and other diversions, including the Chicago diversion; that the Chicago diversion of 10,000 cubic feet per second would produce approximately 55 per cent of the entire lowering of Lake Erie. The report further finds that any diminished or diminishing levels of the lakes due to the Chicago diversion, or any other diversion, may be compensated for by the construction of works in the St. Clair and Niagara rivers of the character described in said report entitled "Final Report, Waterway from Lockport, Ill., to the Mouth of the Illinois River," or by the construction and operation of so-called "regulating works" in the Niagara River, which said works would consist of dams which may be moved at will to regulate the levels of Lake Erie. It was recommended that The Sanitary District be allowed and permitted to withdraw from Lake Michigan 10,000 cubic second-feet of water and that works to compensate for any diminished

or diminishing lake levels should be built at the expense of The Sanitary District.

5. The treaty between the United States and Great Britain of 1909, relating to Canadian boundary waters, provided that there may be diverted from the Niagara River above Niagara Falls, on the Canadian side, water to the extent of 36,000 cubic feet per second and on the American side, 20,000 cubic feet of water per second. The reason that the United States was only permitted to divert 20,000 cubic second-feet as compared with the Canadian right of 36,000 second-feet was because the United States was charged with the diversion of 10,000 second-feet at Chicago. Canada, therefore, can make no objection. The International Waterways Commission was organized and appointed pursuant to the joint action of the Congress of the United States and the Parliament of Canada. Canada and the United States each appointed three members thereof. The purpose of the organization of the International Waterways Commission was, among other things, to recommend the form of a treaty between the United States and Great Britain concerning the Canadian boundary waters. On April 25, 1906, the Canadian section of the International Waterways Commission made a report to the Commissioner of Public Works of Canada, as follows (proceedings I. W. C., page 333):

"At Chicago the Americans had built a drainage canal which, when in full operation will use about 10,000 cubic feet of water per second.

The quantity of water required for the purpose of a ship canal is comparatively small, but the character of this drainage canal at Chicago is such as to involve the continuous flow of water, which will have the effect of lowering Lake Michigan, by over 6 inches and Lake Erie by 4½ inches. The nature of this work may be judged when we state that the expenditure will be over $40,000,000 and that power works are in the course of construction on the canal which will generate some 30,000 H. P.

As the diversion from Lake Michigan to the Mississippi River is of a much more serious character than the temporary diversions from the Niagara River, it is felt that the amount of water taken on the American side of the Niagara River should be limited to 18,500 cubic feet per second. * * * It is exceedingly important in the interest of navigation, both to ourselves and the people of the United States, that the diversion by way of the Chicago drainage canal should be limited. * * * If our pro-

posal is carried out the diversions will be about as follows:

Diversions on the American Side

	Per Second Cubic feet
Niagara Falls	18,500
Chicago Drainage Canal	10,000
Total	28,500

Diversions on the Canadian Side

Niagara Falls and on the Niagara Peninsula	36,000

It is quite apparent that no further diversion can be made on the Niagara River without injury to the scenic effect of the Falls as a whole, and there should be no further diversion from Lake Erie or any other of the waters of the Great Lakes system, which will be injurious to navigation. Your Commission is, therefore, of opinion that the time has come when it is desirable to make a treaty limiting these diversions. * * * Therefore this Commission recommends that a treaty be had between the United States and Great Britain, in framing which, it should be recognized that * * *

Permanent or complete diversions of such waters are wrong in principal, and, therefore, should hereafter be absolutely prohibited. The diversions by the Chicago drainage canal should be limited to the use of not more than 10,000 cubic feet per second. * * * This would give an apparent advantage to Canadian interests, but as the diversion is not of serious injury to the Falls and does not materially affect the interests of navigation, it is more than counter-balanced by the complete diversion of 10,000 cubic feet by way of the Chicago drainage canal to the Mississippi River.

On May 3, 1906, the International Waterways Commission, by report signed by all members, made a report as follows (proceedings I. C. W., 339):

"The Commission has made a thorough investigation of conditions existing at Niagara Falls and the two sections have presented reports to their respective governments setting forth these conditions, to which attention is invited. The following views and recommendations are based upon a careful study of the facts and conditions set forth in these reports * * *

2. While the Commission are not fully agreed as to the effect of diversions of water from Niagara Falls, all are of the opinion that more than 36,000 cubic feet per second on the Canadian side of the Niagara River, or on the Niagara Peninsula, and 18,500 cubic feet per second on the American side of the Niagara River, including diversions for power purposes on the Erie Canal, cannot be diverted without injury to Niagara Falls as a whole.

3. The Commission, therefore, recommends that such diversions, inclusive of water required for domestic use or the service of locks in navigation canals, be limited on the Canadian side to 36,000 cubic feet per second, and on the United States side to 18,500 cubic feet per second (and in addition thereto, a diversion for sanitary purposes, not to exceed 10,000 cubic feet per second, be authorized for the Chicago drainage canal), and that a treaty or legislation be had limiting these diversions to the quantities mentioned.

The effect of the diversion of water by the Chicago drainage canal upon general navigation interests of the Great Lakes' system will be considered in a separate report. * * * The following principles are suggested * * *:

Permanent or complete diversions of navigable waters or their tributary streams should only be permitted for domestic purposes and for the use of locks in navigation canals."

On January 4, 1907, the International Waterways Commission made a special report, signed by all the members, entitled:

'The Chicago Drainage Canal—Joint Report of the International Waterways Commission.'

Among other things in said report, the said Commission stated:

'There appears to be a tacit general agreement that Chicago needs, or will need about 10,000 cubic feet of water per second for sanitary purposes and that the city should have it without further question. * * * We therefore recommend that the government of the United States prohibit the diversion of more than 10,000 cubic feet per second for the Chicago drainage canal.' "

The Motion stated that the Secretary of War's permit of May 8, 1899, is limited only by the capacity of the channel to 10,000 cubic feet of water; that the limitation of flow thereafter made, was solely because of the then narrowness and

shallowness of the Chicago River and its South Branch and West Fork; that thereafter, with the consent of the Secretary of War and for the purpose of enlarging the cross section and channel of the Chicago River and its branches to provide a flow of 10,000 cubic seconds feet, the Sanitary District improved the river by deepening the channel from 17 to 26 feet, and widening it at all points to 200 feet so that its channel capacity was the amount of water desired to be withdrawn and required; that the cause for the limitation of the flow to 4,167 cubic seconds feet having been eliminated, the order of the Secretary of War so limiting it, should be considered of no force and effect.

The motion further set forth (Rec. Vol. VIII, p. 164):

"(7) The diversion of at least 10,000 cubic second-feet of water from Lake Michigan is essential for the sanitary needs and requirements of the population within the the limits of The Sanitary District, which includes that of the City of Chicago and its suburbs, comprising a population of approximately 3,000,000 people. The primary purpose of The Sanitary District is to construct and operate works to provide a pure drinking water supply for this population. The plans for the works of The Sanitary District were formulated and recommended by a commission of engineers, pursuant to an ordinance of the City of Chicago, known as "Drainage and Water Supply Commission." This commission studied the matter for two or three years and finally recommended the diversion of the drainage and sewage of Chicago and its environs to the Desplaines River, together with a sufficient amount of water from Lake Michigan (20,000 cubic feet per minute for each 100,000 population) to oxidize the sewage and waste. This Commission's report was made in 1887 and The Sanitary District Act was passed pursuant to the recommendations of that Commission at the next session of the Legislature, and the District has expended upwards of $100,000,000 in the construction of these works. They have accomplished practical results. There was not at the time the Commission made its report, and there has not been since that time, any other practical method that could have been adopted to accomplish the purpose of these works—namely, the protectection of the water supply. The record in this case shows that the art of artificially purifying sewage has been for years, and is now, in a state of uncertainty, and there is

no plan for artificially purifying sewage that engineers agree is feasible and practical, and will with any certainty serve for a considerable period of time in the future—and this is particularly true when dealing with great metropolitan populations.

The basis, therefore, of The Sanitary District's diversion works is the reversal at all times of the Chicago River, into which a large amount of sewage is emptied from sewers serving the people of Chicago and its suburbs. The maximum run-off of the Chicago River drainage area is 10,000 cubic second-feet. Obviously, if the capacity of the main channel of the District were less than 10,000 second-feet, the Chicago River would flow into Lake Michigan at certain flood times. The withdrawal of water from Lake Michigan must, therefore, be the same amount, because it would be impossible, if the flow were limited to 4,167 feet, or any amount materially below the 10,000 second-feet, to change the flow from the the limited amount to the maximum run-off of the drainage area in time to keep the water from going into Lake Michigan. This is demonstrated by testimony of witnesses in this case and it is recognized as a fact by the report of Col. Warren, Division Engineer of the Lakes Division, above mentioned. The limitation of the flow to 4,167 second-feet, or any amount materially less than 10,000 second-feet, would, therefore, require the absolute and complete purification of all sewage within the limits of the District, so that if any effluent found its way into Lake Michigan, it would not affect the water supply.

There was presented in this case estimates of the cost of constructing artificial purification works to completely purify the sewage and drainage. These estimates were made in the year 1913. The total cost of constructing these works, which would require a great number of years to complete, was from $75,000,000 to $100,000,000. The figures were made with reference to the cost of materials, labor, etc., as of the year 1913. Since that time the cost of labor and materials for similar works has increased approximately 100 per cent, so that to install the works which would be made necessary by reason of the limitation of the flow to 4,167 second-feet, would be from $150,000,000 to $200,000,000. The cost of operating and maintaining these works annually was also estimated, and the estimates were upwards of $5,000,000 per annum. The annual operating and maintenance cost would now, according to present prices of labor and materials, much exceed that amount.

It is also shown in the record in this case that it would be impossible for the District or this community to raise the money necessary to construct these works within any reasonable time, unless constitutional amendment should permit greater bonding power.

In addition to the amount which the District would be compelled to expend by virtue of the limitation of flow to 4,167 second-feet, it would lose the greater portion of the investment that it has already made in the present diversion works.

Furthermore, it is probable that any works which the District might install for the purification of sewage and drainage would, within a very short time, have to be discarded and thrown aside for some other works upon a different plan. Indicative of the changes in the art of artificially purifying sewage that have taken place we refer to the fact that it was only five years ago that most sanitary engineers believed that the best method to be used was the Imhoff Tank system. In these tanks a certain amount of sewage was allowed to settle and the effluent drawn off to run through what are called "sprinkling filters," by which the effluent from the Imhoff tank was, by means of a nozzle, sprayed over crushed rock of several feet in thickness. Lately, sanitary enginers have reached the conclusion that such method is not proper but that what is known as the "activated sludge" system should be used. This system contemplates the passing of the sewage and drainage at low velocities through tanks, which tanks are provided at the bottom with perforations so that a vast amount of air may be pumped through the sewage and thereby the sewage be purified.

If the District were limited now to the withdrawal of 4,167 second-feet, at many times during the year the Chicago River would flow into Lake Michigan, carrying with it a vast amount of sewage. At and prior to the time the Drainage Canal was opened and placed in operation, the death rate per year from typhoid fever was 75 per 100,000 population. Occasionally there would be epidemics, when the rate would be 190 per 100,000. Since the opening of the Drainage Canal there has been a steady reduction in the death rate per year from typhoid fever, with no epidemics, so that now the death rate from typhoid fever is less than 1 per annum per 100,000 of population. According to Hazen's theorem, where there is an increase of 1 per annum in death rate from typhoid fever, there is an increase of 3 from other kindred disease; and the same theorem applies conversely to a decrease. The

limitation to 4,167 second-feet would produce intolerable conditions in the Illinois River, because of the fact that the principal amount of the sewage of Chicago and its suburbs would be delivered to the Desplaines and Illinois Rivers without the necessary pure water for oxidization and purification purposes. All fish life would be destroyed throughout the entire course of said river and the fish industry along the Illinois River is one of the principal industries of the state. The conditions above mentioned that would result from the limitation of flow to 4,167 second-feet would continue until works were installed to practically purify a very large portion of the sewage and drainage arising within the limits of The Sanitary District, and it would continue to a certain extent until the works were installed to purify all sewage and drainage.

8. Since the drainage Canal was opened, January 17, 1900, all boats that were then navigating the Great Lakes and its connecting waters are not interfered with in any respect, by a less depth due to lowering of lake levels. All boats which the United States claims are affected—those owned by the Pittsburgh Steamship Co., a subsidiary of the United States Steel Corporation—were constructed since that time. All the critical points of navigation of the Great Lakes have been, since the opening of the Drainage Canal, deepened or improved, and the record in this case shows that the reference plane for the improvement of 1903, which included practically all the connecting channels, was made approximately 6 inches lower because of the diversion at Chicago—so that, the navigation interests have not been injured. They have the same depth of water that they would have had if the diversion had not existed.

9. The Sanitary District here and now offers and agrees to pay to the United States the amount of money necessary to construct, operate and maintain the compensating works which will off-set or compensate for any damage due to the diversion at Chicago. These works the Federal engineers have said may be installed and will accomplish the purpose named. If they were installed and placed in operation, the only ground of the Government for seeking the injunction here would be removed. The expense would be practically nothing as compared with the financial burden that would be placed upon the District if it is enjoined from withdrawing more than 4,167 second-feet of water, or any amount materially less than 10,000 second-feet. The only thing that the Government would have to do in order to accomplish the instal-

lation of the works would be to provide for their construction, operation and maintenance. The suggestion for modification of the opinion and direction of the Court with reference to the decree in these cases herein made points out the plain practical solution of this problem."

Exhibit "A" to Motion.

"An ordinance of the Board of Trustees of the Sanitary District of Chicago offering and agreeing to defray the expense of the construction of works in one or more of the outlets of the Great Lakes to compensate for any diminishing levels of the Great Lakes and connecting waters due to the diversion of 10,000 cubic feet of water per second from Lake Michigan by the Sanitary District of Chicago and authorizing the attorneys of the Sanitary District in the suits pertaining to said diversions now pending in the District Court of United States for the Northren District of Illinois, Eastern Division, to make and present such offer and agreement in open Court.

Whereas, there are now pending in the District Court of the United States, for the Northern District of Illinois, Eastern Division, two suits in equity instituted by the United States against The Sanitary District concerning the withdrawal of water from Lake Michigan by The Sanitary District of Chicago. The first suit was instituted in the year 1908 and pertains particularly to the construction and operation and withdrawal of water for the operation of the Calumet Sag Channel, an adjunct of the main channel of The Sanitary District of Chicago. The second suit was instituted in the year 1913 and seeks to enjoin The Sanitary District from withdrawing from Lake Michigan, through its various channels, including the Calumet Sag Channel then and now under construction, more than 4,167 cubic feet of water per second. The said suits have been tried together and submitted together upon briefs; and,

Whereas, the Honorable Kenesaw M. Landis, one of the Judges of said District Court of the United States, for the Northern District of Illinois, Eastern Division, before whom said cases have been pending, did recently render an opinion or direction for the entry of a decree in said cases, in substance, to enjoin The Sanitary District of Chicago, defendant in said cases, from withdrawing from Lake Michigan more than 4,167 cubic feet of water per second; and,

Whereas, various reports have been submitted pursuant to acts of The Congress of the United States by the Engineer Corps of the U. S. A., finding that the claim of injury to navigation arising from the lowering of lake levels because of the diversion from Lake Michigan of water at Chicago to the extent of 10,000 cubic feet of water per second, may be compensated for by the construction of fixed weirs or works of similar character, or by the construction and operation of movable dams in the St. Clair, Niagara and St. Lawrence Rivers, or one or all of them, and the expense of constructing said fixed weirs would, at the time the report was made, not exceed $475,000; and it was recommended that if The Sanitary District of Chicago should defray the expense of constructing such works, then they should be maintained by and at the expense of the United States; and, if such works were constructed and placed in operation, thereby the ground of the United States for securing the injunction herein would be removed; and,

Whereas, it is the opinion of the Board of Trustees that if The Sanitary District is enjoined from taking more than 4,167 cubic feet of water per second from Lake Michigan for sanitary purposes, it will be necessary to expend, in the construction of works to artificially purify sewage, supplement and aid the works diverting 4,167 cubic second feet of water upwards of $150,000,000, and the operation and maintenance of the same will exceed upwards of $5,000,000 per annum; and it is, further, the belief of the Board of Trustees of The Sanitary District of Chicago that it is doubtful whether such works, with said limited withdrawal of 4,167 cubic second feet of water will provide for the people of The Sanitary District of Chicago, which includes the population of Chicago and its environs, a safe drinking water supply, for the reason that it would be impossible, with said limited withdrawal, to keep the Chicago River at all times reversed so that it would not flow into Lake Michigan, carrying with it a large amount of sewage and drainage, and it is doubtful whether such purification works would accomplish practical results.

Now, therefore, be it ordained by the Board of Trustees of the Sanitary District of Chicago:

Section 1. The Sanitary District of Chicago does hereby offer and agree to defray the expense, and pay to the United States Government the cost, of constructing and maintaining works to be installed at the outlet or outlets of any of the Great Lakes to compensate for any diminishing levels of the Great Lakes and connecting

waters, due to a diversion or withdrawal from Lake Michigan of 10,000 cubic feet of water per second by The Sanitary District of Chicago through its various channels and diversion works in the event The Sanitary District is not enjoined from diverting from Lake Michigan less than 10,000 cubic seconds feet of water.

Section 2. The said offer and agreement contained in Section 1 hereof is intended to embrace and cover not only the expense of constructing and maintaining fixed weirs or dams described in the report entitled 'Final Report of Waterways from Lockport to the Mouth of the Illinois River.' House of Representative's Document No. 762, 63rd Congress, 2d Session, but also any other works of similar character that may be planned or provided for by the Congress of the United States or by competent Governmental authority, or works known as "regulating works," consisting of movable dams or dams that may be moved from time to time, that may be planned or provided for by The Congress or other competent authority—such works having for their purpose compensation for any diminishing levels of the Great Lakes or connecting waters due to a diversion at Chicago of 10,000 cubic second feet of water; and the said The Sanitary District of Chicago offers and agrees to pay to the United States the expense of constructing and maintaining such works whenever the United States shall provide for such construction and make request for the payment of the amount of money necessary to construct and maintain the same.

Section 3. The attorneys for The Sanitary District of Chicago in said two suits above described, wherein the United States is complainant and The Sanitary District of Chicago is defendant, on behalf of The Sanitary District of Chicago, are hereby authorized, empowered and directed to present and make said offer in open Court in said causes, or in any other manner that the said attorneys may deem proper.

Section 4. The preambles to this Ordinance are hereby made a part of same and this Ordinance shall take effect and be in force from and after its passage."

The said motion was partially heard by Judge Landis. When Judge Landis resigned and ceased to be one of the judges of the District Court of the United States for the Northern District of Illinois, Eastern Division, no order had been entered upon said motion, no decree had been entered

by him and no order or memorandum signed by him stating his findings and conclusions existed.

Order consolidating causes.

The case was thereafter submitted to the Honorable George A. Carpenter, one of the judges of said court, and after hearing argument of counsel on said motion, and in said case, on June 18, 1923, Judge Carpenter entered an order consolidating the cause known as the Calumet suit instituted March 23, 1908, with the Main Channel suit instituted October 6, 1913. At the same time Judge Carpenter rendered his decision in said cause and entered certain other orders hereafter mentioned.

Opinion of Judge Carpenter (Vol. VIII, pp. 127-130).

"CARPENTER, District Judge (orally): It is needless to say that this litigation is of vital interest to the people of the State of Illinois. It was started nearly fifteen years ago by bill filed in behalf of the United States of America against the Sanitary District of Chicago to restrain the defendant from diverting from the waters of Lake Michigan in excess of approximately 4,500 feet per second.

The parties used the better part of six years in putting in the proof. The matter was then presented with appropriate briefs to my distinguished colleague, Judge Landis, for final determination. Judge Landis kept the matter under advisement for another six years, moved undoubtedly by the thought that the State of Illinois was being benefitted all of the time by the withdrawal of 10,000 cubic feet a second by the defendant, and that the Government was not in any way actually harmed.

On June 19th, 1920, Judge Landis rendered an oral opinion, finding in effect that the withdrawal in excess of 4,167 cubic feet a second by the Sanitary District of Chicago was without authority of law; that the withdrawals then being made reduced the level of Lake Michigan, and other of the navigable waters of the United States, to such an extent as to be an interference with navigation; that the Secretary of War, acting under Congressional powers, had never given his consent to such excessive withdrawals; that the diversion by the Sanitary District was therefore unlawful, and an injunction should issue.

A motion was made thereafter not for a reconsideration of the findings of the Court, but for the purpose of settling the terms of the final decree.

Attorneys for the Sanitary District urged the evidence showed clearly that by the construction of weirs and other compensating works at a relatively small expense, the Government could restore the various water levels which had been reduced by the flow into the drainage canal. They also urged that the State of Illinois, by appropriate legislation, had authorized the Sanitary District to agree with the United States Government to stand the cost of such weirs and compensating works and their annual maintenance, and strenuously urged upon the Court that as a condition to the entry of any injunction, the plaintiff Government should agree to erect and maintain such works at the expense of the defendant.

Counsel for the Drainage District have also urged upon the Court at this time to reconsider entirely the case upon the evidence presented.

This Court is very much disinclined to interfere with the judgment of Judge Landis. At least it is entitled to the weight that would be given to the report of a Master in Chancery or Special Commissioner. In addition, this Court has gone over the entire record, and is able to say that it agrees with Judge Landis in every respect, although from a legal standpoint, with some reluctance.

It is not necessary to go into the duties of the Secretary of War with respect to navigable waters. It is not necessary to discuss the question of whether when the State of Illinois entered the Union in 1818 it joined with special reservations with respect to its own police powers. A reading of the Federal decisions from *Gibbons* v. *Ogden*, 9 Wheat, 1, down to the present date leaves no escape from the thought that the States in adopting the Constitution surrendered to the central government everything, without stint or reservation, so far as the terms of the Constitution are concerned. The right to regulate commerce was conferred with many other things, and that right imposed upon the central government to see to it that navigation was not interfered with, either by individuals, the several States, or any foreign power. It is very true that it is the duty of the State of Illinois, in the exercise of its police power, to provide for the safety and welfare of its own people. On the other hand, if that safety and welfare depends upon the operation of the things granted to the central government, the State of Illinois must look to Congress for eventual aid or relief.

The evidence shows, and Judge Landis found and I find that the waters of Lake Michigan and other navigable waters of the Great Lakes have been reduced in level by the amount of water in excess of 4,167 cubic feet per second withdrawn from Lake Michigan by the defendant. From the standpoint of the practical mariner the testimony may not be satisfactory. It was given by engineers more or less highly technical, but thoroughly equipped in their profession. In fact no Lake captain testified that by reason of the lowering of the level of Lake Michigan was navigation interfered with. I have grave doubts whether any boat has been stranded or delayed by reason of the action of the Sanitary District.

On the other hand, the water levels have been reduced, and the Secretary of War, in whom is reposed the sole authority in matters of this kind, has determined that there was an interference with navigation, and a permit to the Sanitary District to continue in its present withdrawals was refused.

The jurisdiction of the Court has not and could not be challenged, and an injunction must issue against the defendant.

The record shows that the Sanitary District of Chicago has expended in its work some hundreds of millions of dollars; and the evidence shows rather conclusively that no other system of disposing of the sewerage in the great district covered would work so well as that devised by the Sanitary District. The City of Chicago, since the Drainage District began to operate, has practcially doubled in population. The district served by the Sanitary District holds more people than over forty states in the Union. The rate of typhoid fever since the completion of the Drainage Canal has been reduced from seventy-five per hundred thousand to a negligible number.

The testimony of Government engineers shows that it would take from ten to twenty-five years for the Drainage District to erect sewerage treatment and disposal works to handle the sewerage within the Drainage District, if the flow of water was reduced from 10,000 to 4,167 cubic feet per second.

This matter is a subject which needs the consideration of thinking people, not only in the State of Illinois, but in the whole United States. The treaty with Canada entered into some years ago seemed to contemplate an acquiescence on the part of the Canadian Government to the withdrawal of 10,000 cubic feet a second by the Drainage District. However that may be, the Secretary of War

has not given his official consent. Whether the increased withdrawal should or should not be made is properly a political and not a legal question, in the absence of consent by the Secretary of War. The Legislature of the State of Illinois, the various civic bodies, the Association of Commerce, and senators and representatives should see to it that at the earliest possible moment the situation here is brought to the attention of Congress, so that by appropriate legislation the health and welfare of this great community may be safeguarded. I have no doubt that when the matter is properly presented it will be taken up by Congress and by the State Department, and some plan devised which will bring about adequate and desired results.

It goes without saying that this Court will not issue an injunction to be effective forthwith. It cannot impose the conditions so strenuously urged by the attorneys for the Sanitary District. It is doubtful whether the State of Illinois could authorize expenditures to be made in foreign states and foreign countries to restore the water levels.

On the testimony of the Government engineers the Court might in the exercise of a sound discretion, delay the affectiveness of its injunction for from fifteen to twenty-five years to enable the Sanitary District or the State of Illinois to arrange for other means of disposal of the sewerage now handled by the Sanitary District.

Believing as I do that it is a matter for the immediate action of Congress, a decree may be prepared finding the facts as stated in the Bill and enjoining the defendant from withdrawing from Lake Michigan in excess of 4,167 cubic feet a second; the decree, however, not to go into effect for six months.

The matter must necessarily go to the Supreme Court of the United States for final settlement, and no doubt, if need be, when the record is there filed, application may be made to that Court for a *supersedeas* or further stay.

Order refusing offer of sanitary district to construct certain works—entered June 18, 1923.

(Vol. VIII, p. 130)

This cause came on to be further heard at this term and was argued by counsel, and thereupon, upon consideration thereof, it was ordered, adjudged and decreed, as follows:

(1) The motion presented herein on the 12th day of July, 1920, by the defendant, asking that the defendant be not enjoined or restrained from withdrawing from Lake Michigan less than ten thousand (10,000) cubic seconds feet of water, and in connection with which said motion an offer was made to pay cost of constructing and maintaining such works as might be provided by complainant to off-set for the lowering of the surface elevations of Lakes Michigan, Huron, St. Claire, Erie and Ontario, due to a diversion of said amount by the defendant at Chicago, is hereby denied, and the said offer is refused.

Enter. CARPENTER, JUDGE, June 18, A. D. 1923.

Decree for injunctions.
(Vol. VIII, p. 131)

This cause came on to be further heard at this term, and was argued by counsel; and thereupon, upon consideration thereof, it was ordered, adjudged and decreed as follows, viz:

That the defendant, the Sanitary District of Chicago, its Board of Trustees, officers, agents, attorneys, representatives, employees and servants, and all other persons acting or claiming or assuming to act under its authority, be, and they hereby are, and each of them hereby is, enjoined from diverting or abstracting any waters from Lake Michigan over and above or in excess of 250,000 cubic feet per minute.

The operation of this injunction is hereby stayed for a period of six months to enable the defendant to present the record herein to the Supreme Court of the United States.

Enter:

Carpenter, Judge. June 18th, A. D. 1923.

Petition for appeal allowed and injunction suspended pending appeal.

June 29, 1923, petition for appeal to the Supreme Court of the United States was filed by the defendant, together with assignment of errors. On the same day, June 29, 1923, an order was entered allowing the appeal, suspending the opera-

tion of the injunction during the pendency of the appeal upon the defendant's filing injunction bond in the sum of $5,000 on said date filed and approved. An order was further entered on said day directing that the evidence as contained in the printed record be incorporated in the transcript of record on the appeal of said cause. On the said June 29, 1923, order was entered that the printed volumes of the record of the testimony and evidence presented before the Commissioner as identified by the signature of the clerk of the court on the initial page of each volume, should be substituted as part of the record showing the testimony and evidence in place of the typewritten transcript of said testimony and evidence filed by said Commissioner. An order was entered also extending the time in which to file transcript of the record in the Supreme Court until and including the 20th day of September, A. D. 1923.

Said orders entered on June 18 and 29, 1923, appear in the record, Vol. VIII, pp. 127, 130, 131, 145 and 147.

Assignment of errors filed June 29, 1923 (Vol. VIII, p. 132.)

(In stating here the assignment of errors, we have grouped various assignments as they appear in the record, as indicated.)

The Sanitary District of Chicago alleges that the injunction entered June 18, 1923, was erroneous because:

(*a*) Plaintiff is not entitled to the injunction granted, and plaintiff's bill should have been dismissed for want of equity. (Ass. 1.)

(*b*) Under the commerce clause of the Constitution, Article 1, Section 8, Clause 3, neither Congress nor any officer of the United States has power to regulate or limit the State of Illinois or The Sanitary District of Chicago in diverting water from Lake Michigan for public welfare in the exercise of the state's police power. (Ass. 2.)

(*c*) The Act of the General Assembly of Illinois of May 29, 1889, under which The Sanitary District was organized, expressly directs defendant to divert and abstract 20,000 cubic

feet of water per minute for each 100,000 population of the district, such population being approximately 3,000,000 people. (Ass. 3, 4, 5, 6, 7.)

(*d*) Said Act of May 29, 1889, of the General Assembly of Illinois, was passed for the sole and only purpose of preserving health and protecting life under the state's police power, and neither Congress nor any officer of the United States can interfere with the reasonable exercise of such police power. (Ass. 8.)

(*e*) The Act of May 29, 1889, of the General Assembly of Illinois and the construction and operation of the works provided to be built thereunder, cannot be interfered with by the United States, when the primary and sole purpose of such legislation and operation of said works is for public health and welfare of the people of the state and the impairment of navigation, if any, is only the indirect result of the operation of said Act of the General Assembly of Illinois and the works constructed thereunder. (Ass. 9.)

(*f*) The pure, wholesome, potable drinking water supply for the people of Chicago, its environs and those within the territorial limits of the defendant, the disposal of the sewage of said people, and the diversion of same from the water supply, can only be obtained through the operation and maintenance of defendant's diversion works constructed under said Act of the General Assembly of Illinois of May 29, 1889, requiring a diversion of 20,000 cubic feet of water per minute for each 100,000 of population (population now upwards of 3,000,000 people.) (Ass. 10, 11, 12, 13 and 14)

(*g*) With the diversion limited to 250,000 cubic feet of water per second, as required by said injunction, works to artificially dispose of sewage supplementary to said diversion and works to filter the water supply of the people, cannot be constructed within a period of less than twenty years, by reason of the inability of the Sanitary District, defendant, to raise funds therefor by taxation and by the issuance of bonds. (Ass. 15, 16, and 17)

(*h*) The Act of Congress of March 2, 1827, entitled "An Act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan", authorized the State of Illinois to build the main channel of the defendant, Sanitary District, supplementary to or in place of the old Illinois Michigan Canal constructed in 1848, and to divert from Lake Michigan for said main channel at least 600,000 cubic seconds feet of water per minute and in excess of 250,000 cubic feet per minute fixed by said injunctional order. (Ass. 18, 19, 20, 21 and 22)

(*i*) The United States had full and complete knowledge of the passage of the Act of May 29, 1889, providing for the construction of the main channel of the Sanitary District with its attendant diversion, the progress of construction, completion, and the purpose of such works and invited and acquiesced in said diversion provided by said Act of May 29, 1889, and is estopped to interfere with it. (Ass. 23)

(*j*) Congress has by various acts fixed the project depths of all harbors and connecting waters of Lake Superior, Michigan, Huron, Erie and Ontario, and the actual depths of water in such harbors and connecting waters has not been less than the project depths fixed, nothwithstanding defendant's diversion. (Ass. 24 and 25)

(*k*) The cost and financial burden resulting to the defendant by virtue of the said injunction and the limitation of said diversion is great, amounting to upwards of $250,000, and the damage to plaintiff by reason of the alleged injury to navigation is slight, and all claimed damage to navigation may be offset or compensated for by construction of compensating works, which cost would not exceed $475,000. (Ass. 26-28)

(*l*) The offer of defendant to pay the cost of constructing and maintaining compensating works to offset for the alleged lowering of the surface elevation of the Great Lakes system, on condition that the decree to be entered should

only enjoin defendant from diverting in excess of 10,000 cubic feet of water from Lake Michigan, should have been accepted by the court and a decree entered as requested by the defendant upon the condition that defendant comply with such offer. (Ass. 29-30)

(*m*) Congress has by various acts appropriated money for and required surveys and reports for a waterway from Chicago to the Gulf of Mexico, whereby the diversion of water by the defendant to the amount of 600,000 cubic feet per minute would be utilized and has by various acts also required surveys as to the means of offsetting or compensating for the lowering of the surface elevations of the Great Lakes system by said diversion, and has thereby indicated that it treated the said diversion by the defendant as existing, and did not intend to disturb it. (Ass. 31-32)

(*n*) Act of Congress of June 29, 1906, relating to the diversion of water from the Niagara River, known as the Act for the Preservation of Niagara Falls, expressly prohibits interference with diversions from the Great Lakes for sanitary or domestic purposes except as Congress might in the future provide. (Ass. 33)

(*o*) The works of the Sanitary District were commenced prior to the passage of the Rivers and Harbors Act of September 19, 1890, and such works are recognized by said act as authorized by law. (Ass. 34)

(*p*) Sections 9 and 10 of the Rivers and Harbors Act of March 3, 1899, do not authorize the Chief of Engineers or the Secretary of War in any manner to supervise or regulate or control the diversion of water by the defendant. (Ass. 35-36-37)

(*q*) Permit of May 8, 1899, authorized the Sanitary District to open its main channel and was without limitation as to amount except the capacity of the main channel of the Sanitary District as fixed by law. This permit was subject to a condition only as to limitation of flow—that if the cur-

rent should be unreasonably obstructive to navigation in the Chicago River, the Secretary of War might modify the discharge from Lake Michigan through the river. Thereafter, due to the then shallowness and narrowness of the Chicago River, its South Branch and West Fork, the Secretary of War ordered the flow limited to 250,000 cubic feet per minute. Because of such limitation for the purpose of providing for the greater flow of 10,000 cubic seconds feet, the Sanitary District, with the consent and approval of the Secretary of War, widened and deepened the channels of said rivers at a cost of approximately $13,000,000 so that there could be withdrawn through said river channels the amount of water required by said Act of May 29, 1889, without injury to navigation. Thereafter the Secretary of War or other officer of the United States was without authority to enforce the order limiting the withdrawal to 250,000 cubic feet per minute, made because of the then narrowness and shallowness of the channels of said rivers. (Ass. 38-39-40-41)

(*r*) The abstraction and withdrawal of water from Lake Michigan by defendant to the amount of 600,000 cubic feet of water per minute, or 10,000 per second, has not and will not impair the navigable capacity of any of the navigable waters of the United States, has not been observed by any lay witnesses, navigator or captain of any ship, or any one engaged in navigation. Such claim is only the result of the analyses of expert witnesses. (Ass. 41-42-43-44-45-46-47-48-49)

(*s*) Defendant cannot observe the injunctional decree without causing pollution of the water supply of upwards of three million people within defendant's limits, from which would result epidemics of typhoid fever and other water-born diseases. (Ass. 50-51.)

(*t*) Injunctional decree herein holds unconstitutional the Act of General Assembly of Illinois of May 29, 1889, under which the Sanitary District, the defendant, was organized. (Ass. 52)

(*u*) Treaty between the United States and Great Britain of January 11, 1909, concerning Canadian boundary waters, recognizes the diversion by the defendant to the amount of 10,000 cubic feet of water per second and precludes an injunction herein as to any diversion of 10,000 cubic feet seconds or less. (Ass. 53-54-55)

(*v*) It does not appear from the evidence that the diversion proposed by the defendant pursuant to said Act of May 29, 1889, under all the facts and circumstances, has obstructed or would unreasonably obstruct navigation. (Ass. 56-57 and 60)

(*w*) Decree herein enforces an arbitrary and unreasonable course pursued by the Secretary of War and the Attorney General. (Ass. 58)

(*x*) The Court should have balanced the equities and in so doing should have refused the injunction and dismissed the complainant's bill for want of equity. (Ass. 59)

(*y*) Congress will not be deemed to have acted concerning a matter of local regulation such as is embraced in the Act of the General Assembly of May 29, 1889, providing for defendant's diversion works, unless it has passed some special law with reference to the alleged obstruction. (Ass. 61)

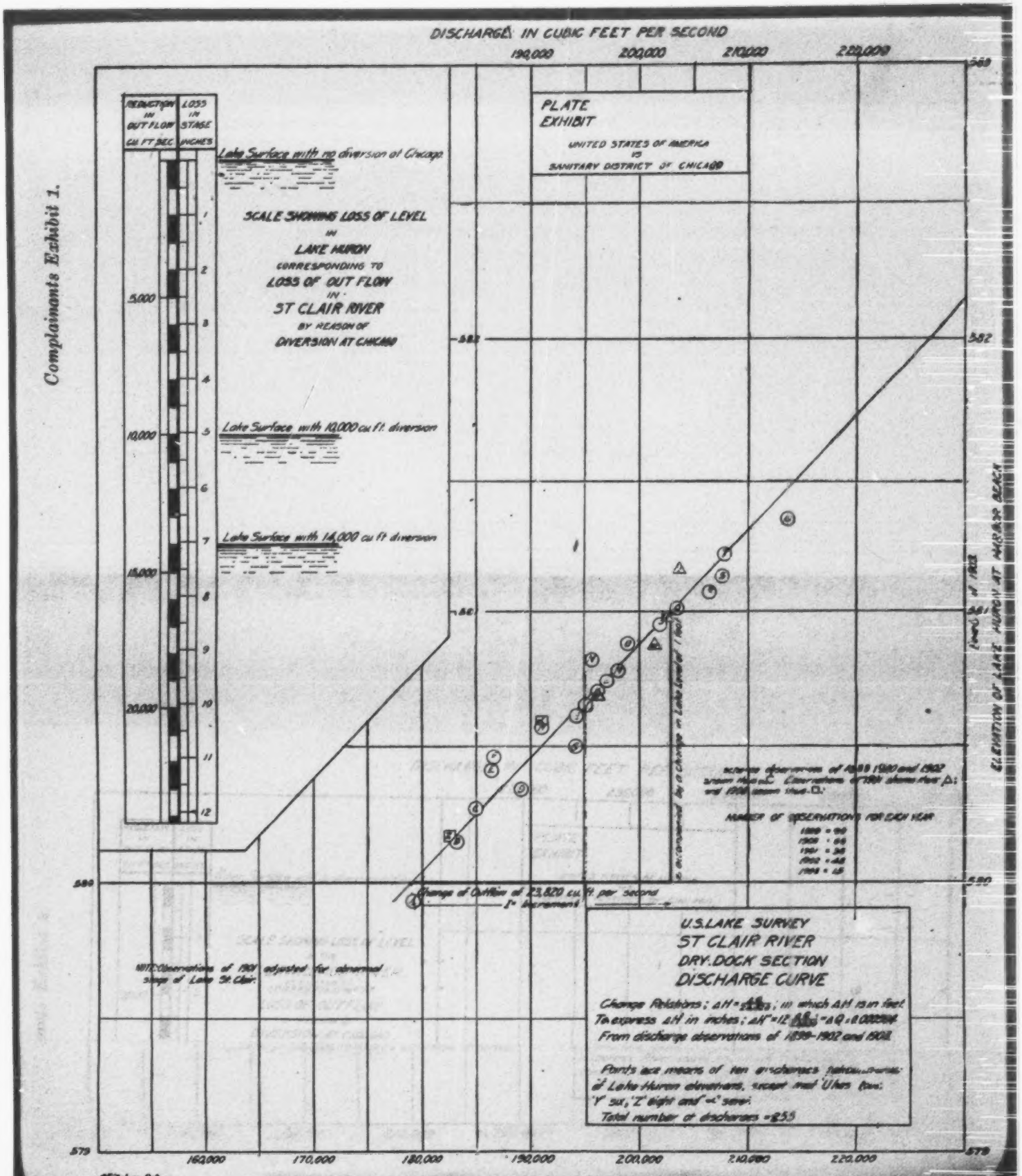
EVIDENCE.

The exhibits attached to and made a part of both the bill of complaint in the Calumet suit and the complaint in the main channel suit, and in the answers thereto by the defendant, and documents quoted in the pleadings, were either admitted by the pleadings or introduced in evidence.

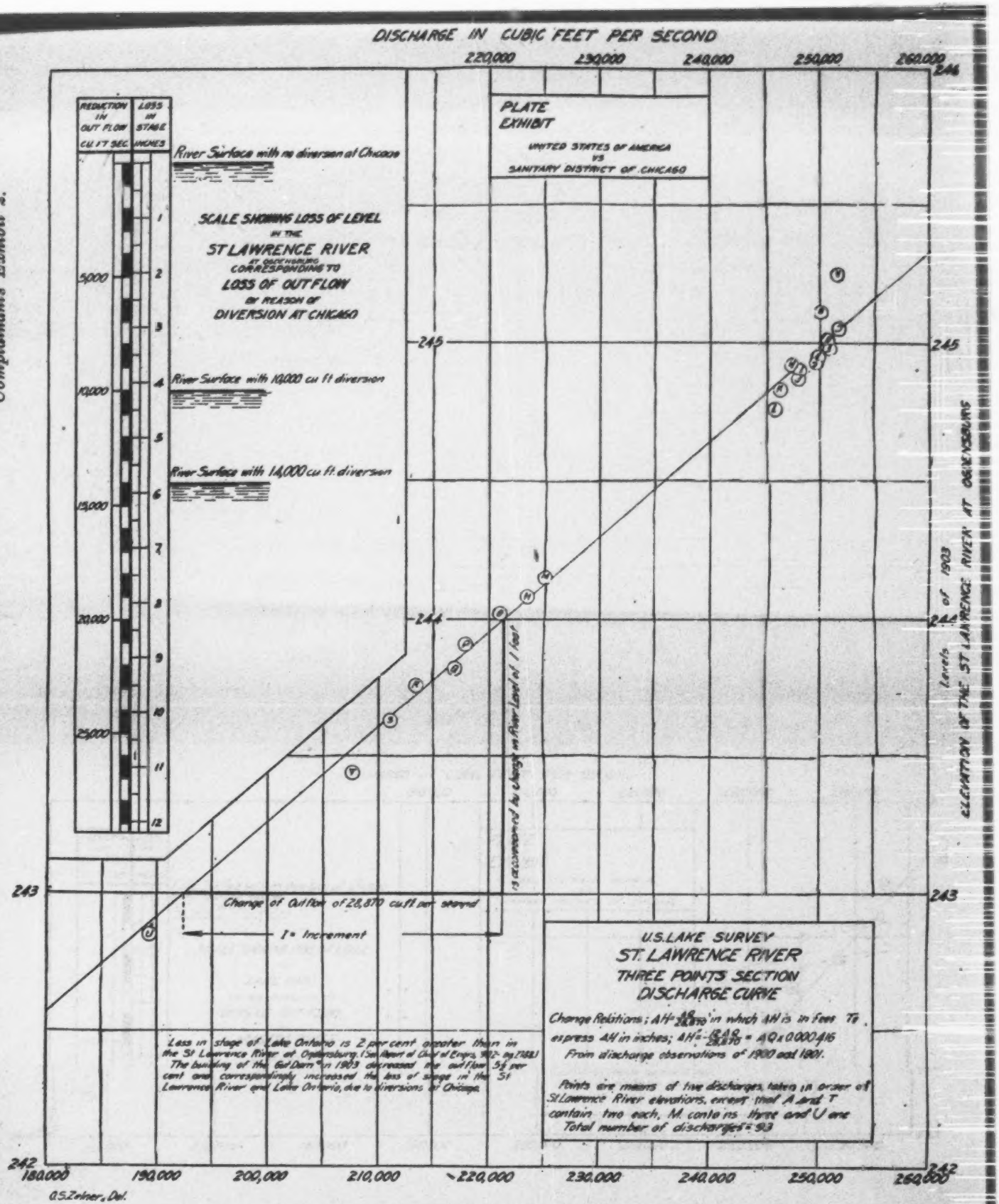
The United States will be hereinafter designated "Plaintiff."

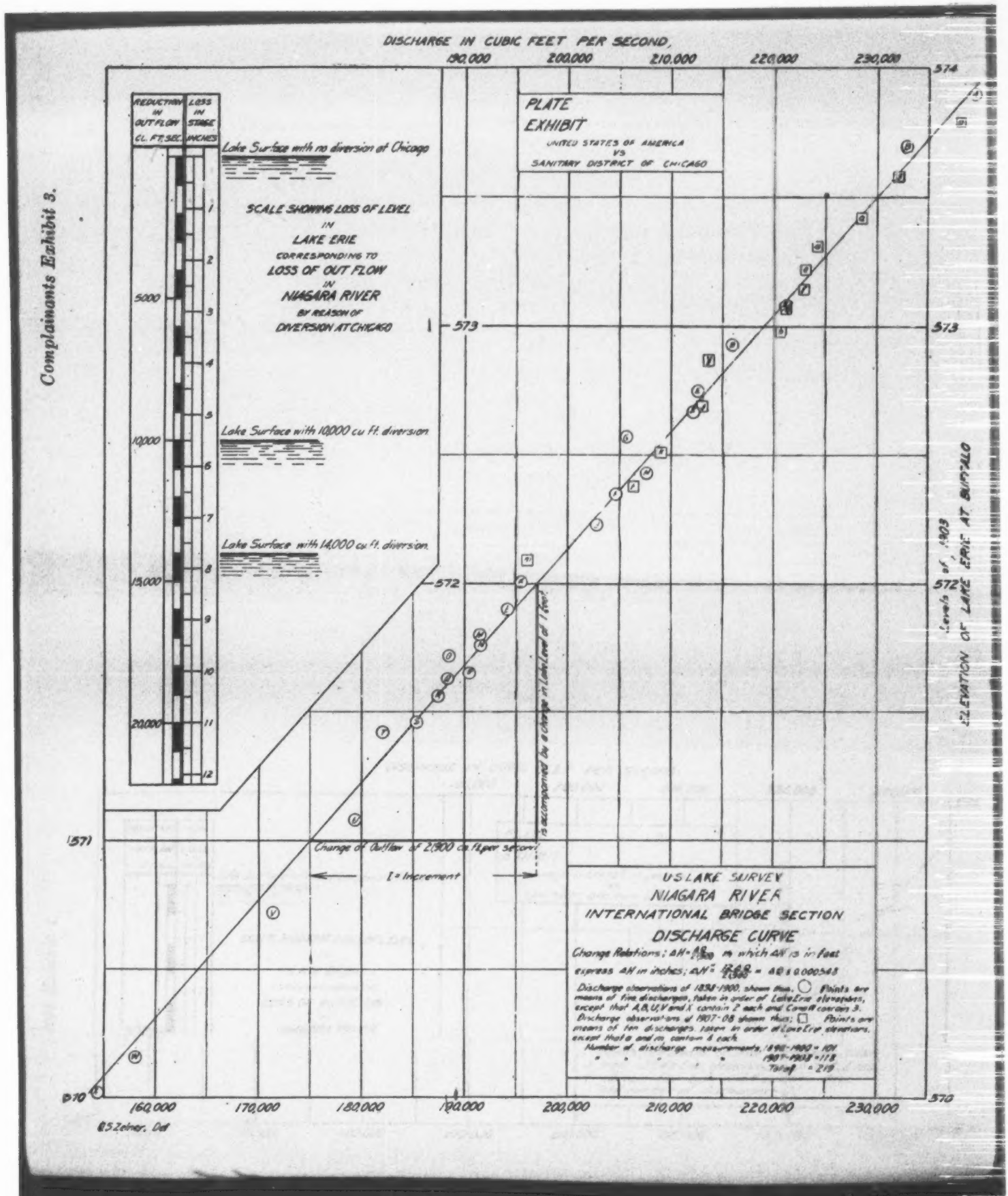
The evidence of plaintiff in chief related principally to establishing the increment of the Rivers St. Clair, Niagara and St. Lawrence by witnesses who were or had been connected with the United States Lake Survey. The increment of a river is the increase or decrease in its flow due to the rise or fall of one foot of the river's controlling lake. The Lake Survey had, running over a period of years beginning with the year 1898, made a great number of discharge measurements of these rivers. Hourly records had been kept of the stage of the various lakes during this period by automatic recording gages. The discharge measurements were then plotted on a piece of paper, each one placed according to the lake stage at the particular time the measurement was made. One side of such paper was measured showing discharge in cubic seconds feet. Another side of such paper vertical to the other was measured showing lake stage in feet above sea level. Thus a point could be ascertained on the paper which would indicate a particular discharge measurement and the elevation of the lake at the time the discharge was made. Having plotted all the discharge measurements in this way, a line was drawn through the plottings which represented the mean of such plottings. The line having been drawn, the discharge of the lake at any elevation within the range of the discharge measurements could be ascertained and thus the difference in the discharge measurement at elevation one foot above any

Complainants Exhibit 1.

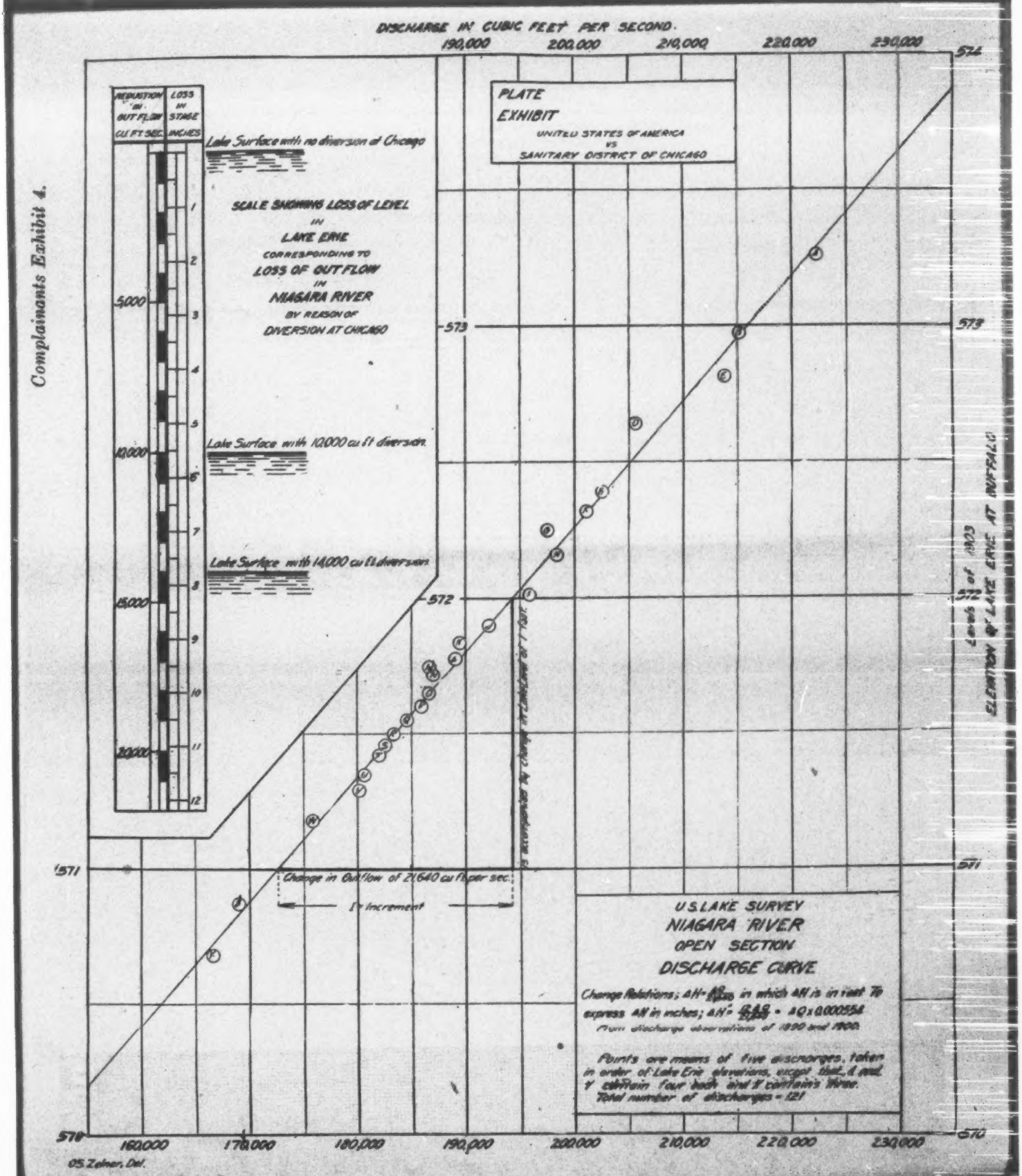


Complainants Exhibit 2.

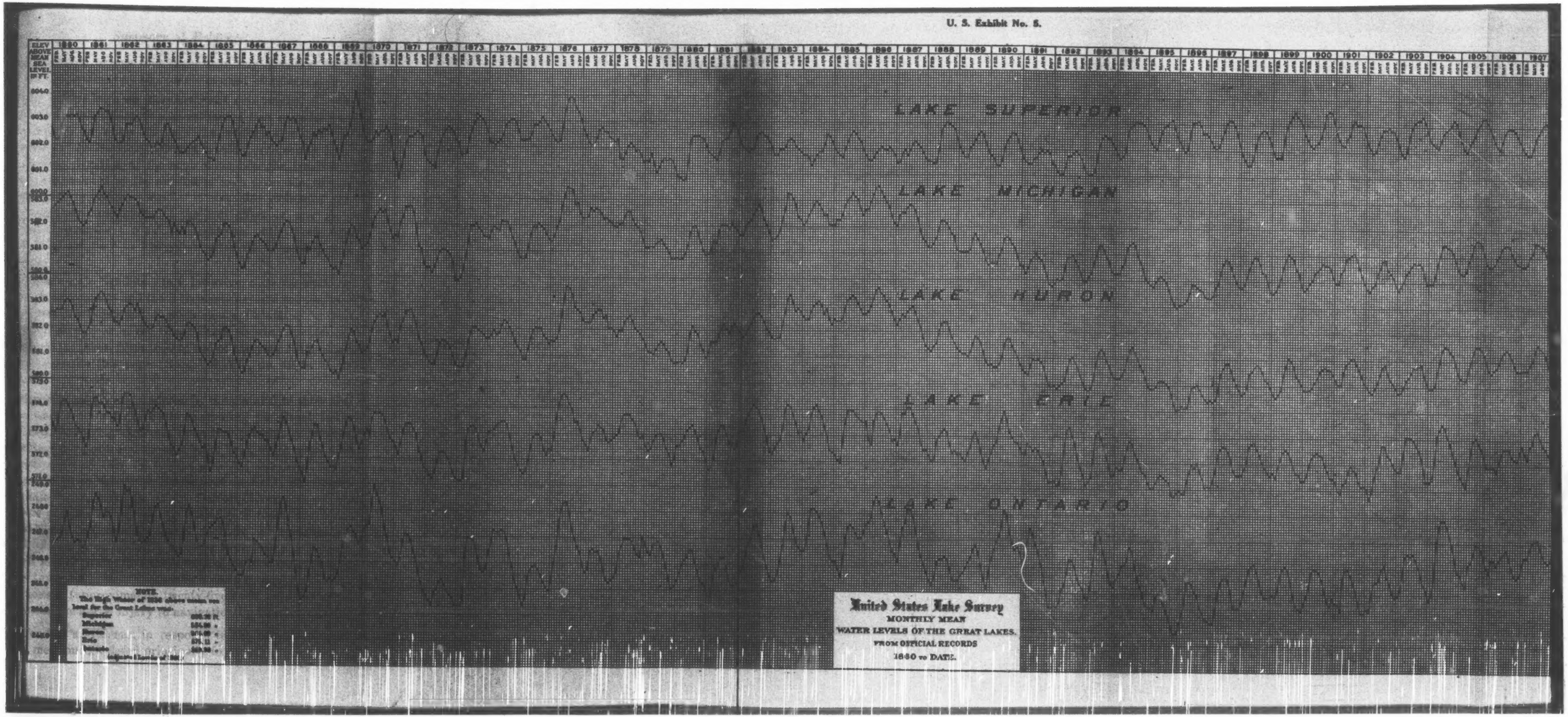



Complainants Exhibit 3.
DISCHARGE IN CUBIC FEET PER SECOND.
190,000
200,000
210,000
220,000
230,000
PLATE
EXHIBIT
UNITED STATES OF AMERICA
VS
SANITARY DISTRICT OF CHICAGO
REDUCTION IN OUT FLOW CU. FT. SEC.
LOSS IN STAGE INCHES
Lake Surface with no diversion at Chicago
SCALE SHOWING LOSS OF LEVEL
IN
LAKE ERIE
CORRESPONDING TO
LOSS OF OUT FLOW
IN
NIAGARA RIVER
BY REASON OF
DIVERSION AT CHICAGO
Lake Surface with 10,000 cu ft. diversion
Lake Surface with 14,000 cu ft. diversion
5000
10,000
15,000
20,000
1
2
3
4
5
6
7
8
9
10
11
12
574
573
572
571
570
Change of Outflow of 2,900 cu ft per second
I = Increment
is accompanied by a change in Lake level of 1 foot
ELEVATION OF LAKE ERIE AT BUFFALO
Levels of 1903
US LAKE SURVEY
NIAGARA RIVER
INTERNATIONAL BRIDGE SECTION
DISCHARGE CURVE
Change Relations; $\Delta H = \frac{\Delta Q}{2,900}$ in which ΔH is in feet
express ΔH in inches; $\Delta H = \frac{12 Q}{2,900} = \Delta Q \times 0.004138$
Discharge observations of 1858-1900, shown thus, ○ Points are means of five discharges, taken in order of Lake Erie elevations, except that A, B, U, V and X contain 2 each and Case B contain 3.
Discharge observations of 1907-08 shown thus; □ Points are means of ten discharges, taken in order of Lake Erie elevations, except that a and m contain 6 each.
Number of discharge measurements, 1858-1900 = 101
1907-1908 = 118
Total = 219
160,000
170,000
180,000
190,000
200,000
210,000
220,000
230,000
©S Zehner, Det

Complainants Exhibit 4.

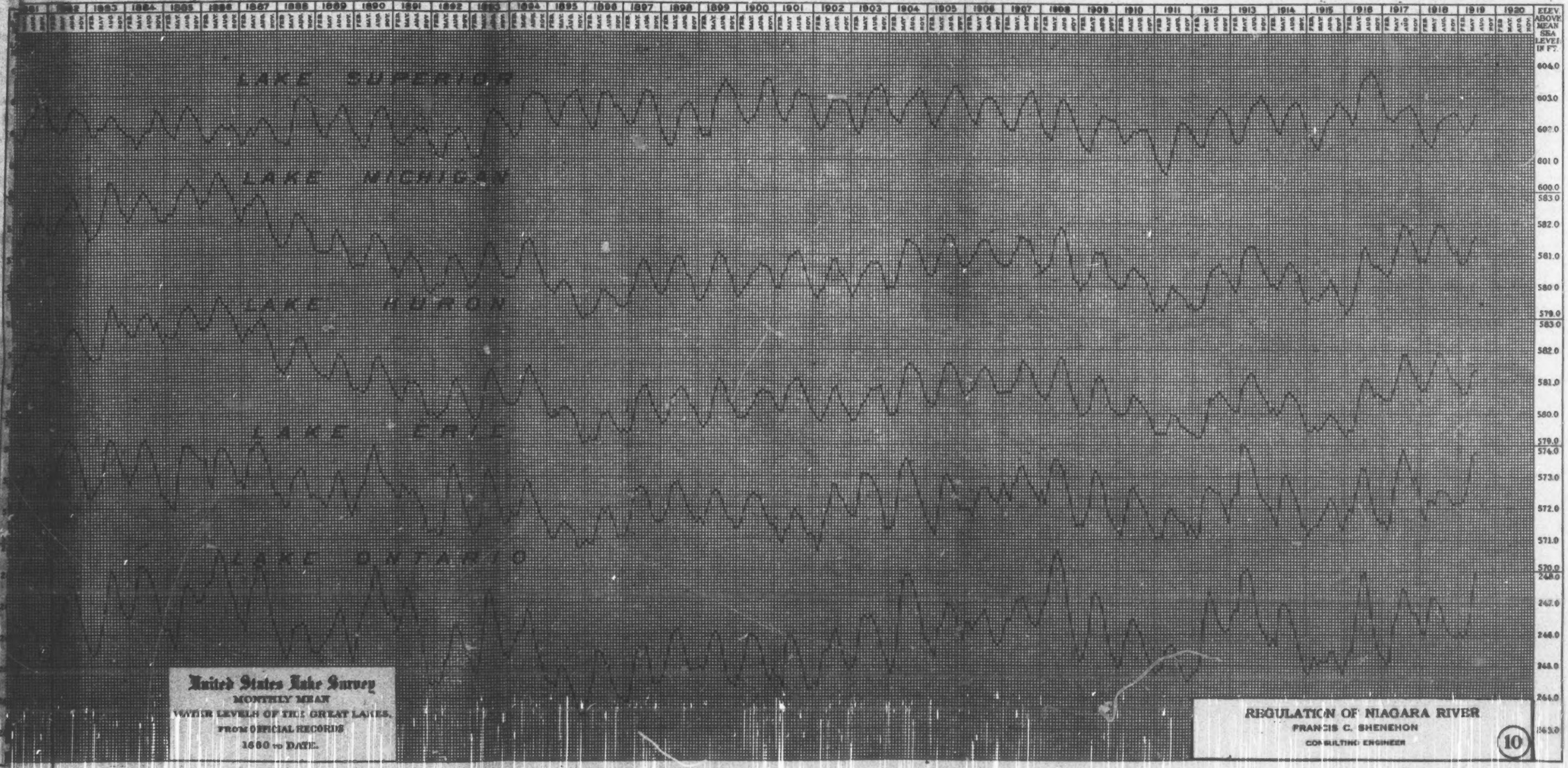


U. S. Exhibit No. 5.



U. S. Exhibit No. 5.

Complainants Exhibit 5.



elevation taken or one foot lower than any elevation taken, could be ascertained by the simple method of subtraction.

Thus, in this way, an increment was determined. Having obtained the increment, it was estimated that a withdrawal or diversion of water through the additional outlet constructed by the Sanitary District would permanently lower the surface elevation of the controlling lake the fraction of a foot, represented by the amount of such diversion, divided by the ascertained increment. It was also estimated that approximately nine-tenths of the full effect of any given amount of diversion through the additional outlet would take place in about four to five years after the diversion commenced.

Complainant's Exhibits 1 to 4, inclusive, show the plottings of the measurements and the increments derived for the various rivers involved, and Complainant's Exhibit 5 is Lake Survey Hydrograph of the Great Lakes showing surface elevations of the lakes, from 1860 to end of the year 1912. They appear opposite this page (Rec., Vol. VII, pp. 49 to 57, inclusive.)

Other witnesses were produced by the plaintiff to show that there were certain large boats navigating the Great Lakes and their connecting channels, operating principally between Lake Superior ports and those of Lake Erie, which could load to depths greater than the depths provided at critical points of navigation on the Great Lakes, such as Sault Ste. Marie, St. Clair River, Lake St. Clair, Detroit River and certain harbors of Lake Erie; that the inability to load these large boats to the full capacity, would decrease the amount that they could carry on each trip by from 90 to 100 tons for each inch of loss of draft; that there were a great number of such boats (over 100); that they make a certain number of trips each season (approximately twenty-five each), and therefore there was a material injury to navigation by this diversion.

Defendant's evidence, in response to the line of evidence above mentioned, related principally to showing:

First, that the discharge measurements of the different rivers were inaccurate, and the correct increment was not obtained, and therefore the effect upon the different controlling lakes was not as great as estimated by the plaintiff's witnesses by about two inches.

Second, that due to the hourly and daily continuous fluctuations and oscillations of the lake surfaces, boats could not load within such narrow limits, and therefore the loss of carrying capacity due to the few inches (five inches on Lake Michigan for 10,000 seconds feet diversion), claimed effect upon the lakes by the diversion, was negligible;

Third, that the cost of dredging the critical points of navigation to offset for the claimed effect upon navigation, would be small;

Fourth, that compensating or regulating works restricting the flowage capacity of the different rivers mentioned, could be, at small expense, installed, and their operation would entirely restore the lake levels to their natural condition without injury to navigation, and that such method had been recommended by various boards of engineers of the United States, made pursuant to Congressional acts.

Hydraulic Expert Evidence.

The evidence of the plaintiff and defendant upon the ascertainment of the correct increments of the different rivers involved and upon the effect of different amounts of diversion upon the levels of the different lakes will be stated briefly. Such evidence consists of the testimony of hydraulic engineering experts on both sides covering a large portion of the record. Only enough of the testimony of the experts on both sides will be stated to show the methods used and results reached.

The hydraulic engineering experts for the plaintiff in its evidence in chief, and their respective qualifications, are as follows:

ALFRED NOBLE (Vol. I, pp. 1-30):

Graduate civil engineering, University of Michigan; later honored with the degree of LL. D.; for twelve years at Sault Ste. Marie in the employ of the United States, and had local charge of the St. Mary's Falls Canal and River; a member of the Board of Engineers on Deep Waterways, which worked out projects for thirty foot channels connecting the Great Lakes with the Atlantic by way of the Hudson River; member of Nicaragua Canal Board and the Isthmian Canal Commission; president of the American Society of Civil Engineers; while member of the Board of Engineers on Deep Waterways, caused measurements of the discharge of the Niagara River to be made in 1897 and 1898.

EUGENE E. HASKELL (Vol. I, pp. 30-49):

Graduate of the College of Civil Engineering, Cornell University, and when he testified, he was dean or director of said college; was then a member of the International Waterways Commission; had been connected with river and stream hydraulics for approximately thirty years; studied ocean currents, including the Gulf Stream, under the Coast and Geodetic Survey; made stream measurements of the Mississippi River, and the discharge measurements of the rivers of the Great Lakes principally were under his direction as principal assistant engineer of the United States Lake Survey. Mr. Haskell designed a current meter known as the Haskel meter.

W. EDWARD WILSON (Vol. I, pp. 49-57):

Graduate College of Civil Engineering, Cornell University; had charge of the hydraulic measurements on the St. Mary's River in 1901 and 1902, and did some similar work on the Niagara River in 1903; while assistant professor of civil engineering in the University of Utah, for three years did some

hydraulic work in the Rocky Mountains. At the time he testified in 1909, he was secretary of the International Waterways Commission, and had been for two years and a half theretofore. He had to do with the hydraulic investigations of the Great Lakes involved in the discussion of the proposed regulation of Lake Erie, in the report of the International Waterways Commission.

GEN. O. H. ERNST (Vol. I, pp. 57-58):

Retired brigadier general of the Corps of Engineers, United States Army; graduate of West Point; from 1871 to 1878 was instructor of practical military engineering at West Point, and for eight years thereafter he was in charge at St. Louis of the River and Harbor District there, including the Mississippi River. For ten years he was a member of the Missouri River Commission, and for six years a member of the Mississippi River Commission, serving as its president from 1903 to 1906; at Galveston he was in charge of the rivers and harbors of the Texas coast; 1899 was a member of the Isthmian Canal Commission; 1901 to 1905 he was stationed at Chicago in charge of the rivers and harbors of that district, and was also engineer of the Northwest Division, which included the Great Lakes System as far east as Erie, Pennsylvania; was chairman of the Board of Engineers which made surveys and estimates for waterway from Chicago to St. Louis; in 1905 he was appointed on the International Waterways Commission as chairman of the American Section. The Commission made a special report on the Chicago Drainage Canal.

COL. CURTIS McDONALD TOWNSEND (Vol. I, pp. 71-72):

He was an officer of the Corps of Engineers; was stationed at Detroit; had charge of the District, including the Detroit and St. Clair Rivers, Lake St. Clair and certain harbors in

Lake Huron, and the St. Mary's River, including the ship locks at that place. At one time he was in charge of the Mississippi River District, the Grand Rapids District, including the rivers and harbors on the east shore of Lake Michigan, the Rock Island District, including the upper Mississippi River from St. Paul to St. Louis, and the Harbor of Manilla in the Philippines; the rivers and harbors of the Cleveland District, including the harbors of Lake Erie from Toledo to Conneaut.

EBEN S. WHEELER (Vol. I, pp. 87-155):

Graduate of civil engineering of the University of Michigan; was United States Assistant Civil Engineer in the office at Detroit; served under Colonel Townsend; engaged for a number of years on surveys of the Great Lakes made by the United States Lake Survey; assisted in some of the earlier stream measurements in the Detroit and St. Clair Rivers; was at Sault Ste. Marie, succeeding Alfred Noble there, in charge of the operation of the ship locks and in the improvements of the river channels; was chief engineer of the Nicaragua Commission of 1898 and 1899.

LOUIS C. SABIN (Vol. I, p. 156):

Graduate of the University of Michigan in civil engineering, and assistant on the improvements of the St. Mary's River from 1890 to 1897; made surveys and discharge measurements for the Lake Survey from 1898 to 1903; assisted on St. Mary's River improvements 1903 to 1905; 1905 and 1906 secretary of the American Section of the International Waterways Commission. At the time he testified, was in local charge of improvements on the St. Mary's River, and general superintendent of St. Mary's Falls Canal; 1898 to 1906 Mr. Sabin was in immediate charge of the hydraulic work on the St. Clair River, and in the reduction of the observations made.

MAJOR CHARLES KELLER (Vol. I, p. 224):

Graduate of West Point; since 1893 has been engaged in the work of river and harbor improvement; the United States Lake Survey which made the hydraulic measurements involved in this case, was under his charge from May, 1907, to the date he testified in 1909; had given special duty to lake levels as connected with the discharges of the connecting rivers.

SHERMAN MOORE (Vol. I, p, 252):

Graduate of the University of Wisconsin as a civil engineer; employed by the United States Lake Survey and has been engaged in such work since 1902 to the date he testified in 1909; for three years preceding 1909, he was almost exclusively employed on hydraulic measurements on the Niagara River on work connected with the investigation and preservation of Niagara Falls.

F. G. RAY (Vol. I, p. 273):

Graduate of the University of Iowa, 1902, and engaged in civil engineering work since that time; with the Mississippi River Commission until 1900; since then has been employed by the United States Lake Survey; charge of the field parties on triangulation, hydrography and topography during summer seasons and in winter in the reduction of the notes of water levels, hydraulics, etc.

F. C. SHENEHON (Vol. I, pp. 283-427).

Graduate of University of Minnesota; at the time of his direct testimony in 1909, he was principal civilian engineer of the United States Lake Survey; between 1886 and 1888

his engineering work consisted principally in the location and construction of railroads; from 1888 to 1891, in general practice as a civil engineer at Sault Ste. Marie, and then entered the service of the engineering department of the United States in the construction of the Poe Lock at Sault Ste. Marie; there until 1898; his work included channelizing the St. Mary's River, making discharge measurements of the St. Mary's River; in 1898 he was engineer for the Board of Engineers on Deep Waterways in charge of the Buffalo office. This work included slope measurements on rivers and the overseeing of discharge measurements at the International Bridge Section. He then took up work as an engineer for the United States Lake Survey, and between September, 1898, and August, 1900, made extensive measurements of the flow of the Niagara River and investigations of its hydraulics. In 1900 he took up the hydraulic measurements of the St. Lawrence River and was engaged in this work during the fall of 1900 and the spring of 1901. In the winter of 1901 additional measurements of the flow of the St. Lawrence was made through the ice; made report on preservation of Niagara Falls; succeeded E. E. Haskell as principal assistant engineer of the Lake Survey. In 1906 to 1909 he had jurisdiction over the hydraulic work done on the St. Clair and Niagara Rivers. In 1909 resigned and became Dean of the College of Engineering of the University of Minnesota.

Williams Exhibits 1 to 15, inclusive, are Lake Survey Charts or Maps, showing the five Great Lakes and their connecting channels, ~~and appear as appendices to this narrative.~~ (Rec., Vol. VII, pp. 59 to 87, inclusive.)

The witnesses for the plaintiff above mentioned in their direct testimony stated and concluded as follows:

(A.) That a diversion of 23,820 cubic feet per second from Lake Michigan would lower the level of the said Lake and Lake Huron, one foot. (Noble, Vol. I, p. 8; Sabin, Vol. I, p. 165; Keller, Vol. I, p. 228; Moore, Vol. I, p. 264; Shenehon, Vol. I, p. 296.)

That a diversion of 21,900 or 21,640 cubic feet per second from Lake Erie would lower the level of the lake one foot. (Noble, Vol. I, p. 13; Wheeler, Vol. I, p. 113; Moore, Vol. I, p. 265; Shenehon, Vol. I, p. 302).

That a diversion of 28,870 cubic feet per second from Lake Ontario would lower the level of that lake one foot. (Noble, Vol. I, p. 12; Wheeler, Vol. I, p. 113; Sabin, Vol. I, p. 172; Moore, Vol. I, p. 257.)

That any other amounts of diversion would lower the level of each lake in proportion to the respective amounts for one foot lowering. (Noble, Vol. I, p. 9; Haskell, Vol. I, p. 40; Wilson, Vol. I, p. 52; Ernst, Vol. I, p. 60; Wheeler, Vol. I, p. 99; Sabin, Vol. I, p. 172; Keller, Vol. I, p. 229; Moore, Vol. I, p. 266 and Shenehon Vol. I, p. 296.)

It was further developed that the determination of the above items were based upon measurements of the St. Clair, Detroit, Niagara and St. Lawrence Rivers by means of Haskell current meters. (Haskell, Vol. I, pp. 32, 36; Keller, Vol. I, p. 226; Moore, Vol. I, p. 260.) Also that the discharge so measured was assumed to be that due and corresponding to the elevation of the respective lakes at approximately the same time as the discharge measurements. (Shenehon, Vol. I, p. 300.)

(B) That the construction of the Gut Dam on the St. Lawrence River has decreased the flow of the St. Lawrence River about five and one-half per cent, (Moore, Vol. I, p. 256; Shenehon, Vol. I, p. 295), and has raised the level of Lake Ontario about five inches. (Shenehon, Vol. I, p. 308.)

That there have been no changes in the channels of the St. Clair and Detroit Rivers affecting the levels of the Lakes during the period of the government improvements therein. (Sabin, Vol. I, p. 175; Keller, Vol. I, p. 241; Shenehon, Vol. I, p. 317.)

As to the points mentioned, on cross examination, the witnesses testified:

As to "A"—That it had been assumed that the position of Lake St. Clair need not be considered in establishing the condition of lowering of Lakes Michigan-Huron from the experiments (Shenehon, Vol. I, p. 368), and that a series of measurements in 1901 had been excluded from the computation because Lake St. Clair was abnormally low. (Shenehon, Vol. I, p. 367.)

As to "B"—That the improvements in the St. Mary's River had certainly lowered the level of the water at the locks at Sault Ste. Marie (Shenehon, Vol. I, p. 327), and that it was possible that the improvements in the St. Clair and Detroit Rivers might have lowered the levels of Lakes Michigan and the St. Clair by small amounts. (Shenehon, Vol. I, p. 374.)

The lowerings in inches for 10,000 cubic seconds feet diversion at Chicago for the different lakes, as testified to by the plaintiff's different witnesses in chief, are shown by the following table:

Ref. No.	Witness	Michigan and Huron	Ref. Record	Erie	Ref. Record	Ontario	Ref. Record	
1	Keller			5.7	I-237-8			Quintus
2	Keller	5.	I-229	5.5	I-234	4.2	I-233	1893
3	Noble			4.8 5.8	I-13			From U. S. Exs. 1 to
4	Haskell	6.2	I-35-41	5.	I-40	4.2	I-40	4, Vol.
5	Wilson	6.2	I-51	5.	I-52	4.2	I-52	VII, 49-55.
6	Ernst	6.2	1-60	5.4	I-61	4.2	I-61	
7	Wheeler	4.8	1-99	5.5	I-103	4.3	I-106	
8	Sabin	5. 7.5 5.5	1-167 1-194	5.5	I-172	4.3	I-172	
9	Moore	5.7 5.5	1-265	5.5	I-254	4.3	I-257	
10	Ray	5.7 5.0	I-279					
11	Shenehon	6.2	I-296	5.5	I-304	4.3	I-295	

The hydraulic expert witnesses and their respective qualifications, testifying for the defendant in chief are as follows:

GARDNER S. WILLIAMS (Vol. II, pp. 566-990):

Ann Arbor, Michigan; member of the American Society of Civil Engineers, Detroit Engineering Society, American Water Works Association, New England Water Works Association and others; received the degree of Bachelor of Science in Civil Engineering University of Michigan, 1889; interested in and connected with the study of hydraulics and hydrography of the Great Lakes from the time he became civil engineer of the Board of Water Commissioners of Detroit in 1893; in 1898 became Prof. of experimental hydraulics and engineer in charge of the Hydraulic Laboratory, Cornell University; there until 1904, when he became Prof. of Civil, Hydraulic and Sanitary Engineering, at University of Michigan; in 1911 resigned to enter consulting practice; consulting engineer for the Michigan-Lake Superior Power Company on hydraulic installation at Sault Ste. Marie, and upon discharge measurements of the St. Mary's River before that. 1899-1900 consulting engineer for the Edison Sault Electric Company and the Chandler-Dunbar Water Power Company, and as such designed and supervised the construction of power plant in rapids at Sault Ste. Marie; consulting engineer for the Eastern Michigan Edison Company on water power developments on the Huron River; consulting engineer to Canadian Light & Power Company in connection with power development and incidental improvements to navigation on the Couteau and Cedar Rapids of the St. Lawrence River near Montreal.

FREDERICK P. STEARNS (Vol. II, pp. 990-1143):

Boston, Massachusetts; consulting civil engineer; been engaged in such work since 1869; from 1872 to 1880 was engaged upon the construction and operation of a new system

of water supply for Boston; 1887 measured the flow of the Sudbury River, using the current meter; made experiments upon the flow of water over weirs through channels and pipes and upon the current meter, the results of which were published in the transactions of the American Society of Civil Engineers; 1880-1886 engaged in the construction and later in the operation of the Boston Main Drainage Works and sewage disposal for the city; 1886-1895 chief engineer of the Massachusetts Board of Health. This work involved the discharge of sewage into streams and the care and control of streams used for water supply and the study of the condition of polluted rivers; 1895-1907 chief engineer of the Metropolitan Water Board and its successor, the Metropolitan Water & Sewer Board; was consulted in many cases, such as reporting upon the sewerage of the District of Columbia, consulting engineer of the First Rapid Transit Commission of Boston; consulting engineer to the Charles River Basin Commission of Boston; consulting engineer of the Board of Water Supply of the City of New York; 1905 to 1906 member of the International Board of Consulting Engineers for the Panama Canal; one of the advisory engineers to the Sewage Commission of the City of Baltimore; November and December, 1906, was a member of Board of Consulting Engineers to examine and report upon means for supplying water to the City of Los Angeles; 1905 received honorary degree of Master of Arts from Harvard University; 1906 Doctor of Science from the University of Michigan.

JOHN R. FREEMAN (Vol. III, pp. 1145-1195):

Providence, Rhode Island; civil engineer and engaged in such practice since 1876; graduated at that time in civil engineering, Massachusetts Institute of Technology; from 1876 to 1886 was principal assistant engineer of the Water Power Company controlling the Merrimac River at Lawrence, Massachusetts. A large part of his duties was measuring the quantity of water used by various factories and the flow of

the Merrimac River. At that time also was principal assistant to Hiram F. Mills in consulting engineering; measured the water used by factories at Manchester, New Hampshire; made investigations for water power development at Concord, New Hampshire, involving the flow of the river and making gagings of it; made exhaustive studies of the methods of accurate measurement of flowing water; the yield of water sheds of rivers and studies of evaporation. In 1895 member of Metropolitan Water Board of Massachusetts, which was to build waterworks to supply about fifteen different municipalities, Boston being one. For two years consulting engineer, New York State Water Supply Commission. For twelve years was consulting engineer to the City of New York in connection with the improvement and enlargement of its water supply, involving the estimation of the yield of many watersheds, etc.; consulting engineer to many cities in connection with water supply—namely, Nashua, New Hampshire, Los Angeles, California, Baltimore, San Francisco, Mexican Government on extension of water supply of the City of Mexico; consulting engineer of the Canadian Government on matters of water power development on various rivers in Western Canada; made studies of obstructions to flow of rivers caused by ice, such as the St. Lawrence River at Massena and at the Long Soo Water Power Development on said river; consulting engineer to Water Power Companies, Niagara Falls; consulting engineer to Mississippi Water Power Company with reference to the development of water on Mississippi River at Keokuk, Iowa; member of two boards of engineers appointed by President to investigate matters connected with the building of the Panama Canal; planned water power development of the Great Western Power Company upon the Feather River in California.

JOSEPH RIPLEY (Vol. III, pp. 1277-1353):

Resides Albany, New York; civil engineer; 1867 graduated civil engineering, University of Michigan; 1913 at the time he testified, he was consulting engineer to the state engineer on the Barge Canal Construction; member American Society of Civil Engineers; Western Society and others; 1877 employed by the Government on canal work at Sault Ste. Marie, Michigan; construction of the Weitzel Ship Lock, Alfred Noble being the civilian engineer in charge; was so connected with the work on the Great Lakes until 1906; first two years construction of the Weitzel Lock; next survey work of the St. Mary's River; 1879 dredging for deepening the channels of that river; 1897 became general superintendent in charge of the ship canal at Sault Ste. Marie and the St. Mary's River; was familiar also with the improvement of navigation on the Detroit River; was a member of the Board of Consulting Engineers in August, 1905, which studied and reported as to the type of canal to be built at Panama; was principal assistant engineer in charge of the plans for the construction of locks and regulating works in connection with the Panama Canal.

E. W. SCHROEDER (Vol. III, pp. 1533-1563):

Resides Ithaca, New York; graduate of University of Washington (Seattle), 1900; pursued post-graduate work at Cornell in engineering; at the time he testified, 1913, teacher and engineer at Cornell University and in charge of the hydraulic laboratory; has been connected with the university as such practically since 1900; made many experiments in hydraulics at the laboratory; made numerous experiments at the request of Gardner S. Williams in the hydraulic laboratory of Cornell University to ascertain the operation of the Haskell current meter in swift, turbulent and slow flowing waters. Such experiments were carried on in conjunction with Prof. K. B. Turner of the College of Civil Engineering, Cornell University.

KENNETH B. TURNER (Vol. III, pp. 1563-1592):

Resides at Ithaca, New York; teacher of civil engineering at Cornell University; at Cornell University for five years taking degrees of Civil Engineer and Master of Civil Engineer; with the United States Lake Survey for approximately two years, beginning with January, 1905. This was after the degree was obtained at Cornell. While with the Lake Survey worked in connection with river discharge measurements at Sault Ste. Marie and the St. Mary's River; also reduced the discharge measurements; used the Haskell current meter; carried on experiments with Professor Schroeder, Cornell University Hydraulic Laboratory, to ascertain the operation of the Haskell current meter in turbulent, swift and slow moving waters.

LYMAN E. COOLEY (Vol. III, pp. 1703-1810):

Resides at Evanston, Illinois; civil engineer; when testified (1914) consulting engineer to the Sanitary District of Chicago; received the degree of civil engineer at Rensselaer Polytechnic Institute, Troy, New York, in 1874, and has practiced the profession since. First eleven years, to 1885, connected with Northwestern University at Evanston, for three and one-half years of which was professor of Engineering and Mathematics; for six years during this period was assistant engineer to the war department on improvement of western rivers; from 1884 work consisted principally with the development of the Chicago Sanitary District Works; designed intercepting sewers for the lake front; 1905-1907 member International Deep Waterways Commission; engineer for the Union Water Company, Denver, Colorado; constructed the Cheseman Dam, 210 feet high; designed the Keokuk Water Power Works; reported on the Barge Canal; consulting engineer to the Gulf Deep Waterway Association; employed by the attorney general of Illinois in the case of the State of Illinois *vs.* Economy Light & Power Company, involving the

proposed dam of that company across the Desplaines River; was later employed by the United States in its suit against the Economy Light & Power Company, involving the same dam; 1886-1887 was engineer to the Drainage & Water Supply Commission, which recommended the construction of the works afterward built by the Sanitary District of Chicago to protect the water supply of Chicago.

The Great Lakes occupy six depressions in the earth surface, and receive the drainage or run-off from a large area of adjacent land partly in Canada and partly in the United States, which run-off reaches them in major part by flowing over the surface in rivers and creeks. (Rec., Vol. II, p. 584.)

The precipitation varies in amount from month to month and year to year. On the Huron-Michigan drainage area, it varied from 38.63 inches in 1883 to 27.17 inches in 1895, a variation of about 42% from the minimum. (Rec., Vol. VII, p. 202-208.) Evaporation takes place from the lake surfaces and from the ground and plant life.

These two agencies, precipitation and evaporation, are the principal ones affecting the annual and monthly elevation of the Great Lakes, and are responsible for the major part of their fluctuations. (Rec., Vol., II, p. 585.)

The levels of the Great Lakes were actually higher during the ten years immediately following than during the ten years immediately preceding the opening of the Chicago & Sanitary Ship Canal. (Rec., Vol. II, p. 727-739.)

The diversion from the Great Lakes at Chicago through the Sanitary & Ship Canal, varied progressively from 4,300 cubic feet per second in 1900, to approximately 7,600 cubic feet per second in 1910, and 1913. (Rec., Vol. III, p. 1618.)

The defendant's witnesses above mentioned testified and concluded as follows:

That it would take a much larger diversion of water from Lakes Michigan-Huron than the amount testified to by the

plaintiff to lower their surfaces one foot. (Williams, Vol. II, pp. 643, 649, 657, 658, 660, 662, 663, 664 and 740; Stearns, Vol. II, pp. 1032, 1036; Freeman, Vol. III, p. 1148); that it would take a larger diversion than that testified to by the plaintiff to lower the surface of Lake Erie one foot. (Williams, Vol. II, p. 668, 670, 671, 672, 674, 722 and 740; Stearns, Vol. II, pp. 1104, 1106); that it would take a larger diversion from Lake Ontario than that testified to by the plaintiff to lower its surface one foot. (Williams, Vol. II, pp. 666, 740; Freeman, Vol. III, p. 1148.)

That the assumptions by which the measurements of discharge were rated to the lake elevations producing them were incorrect. (Williams, Vol. II, pp. 651, 652, 654; Stearns, Vol. II, p. 1032, 1035; Freeman, Vol. III, pp. 1149, 1150; Cooley, Vol. III, pp. 1772, 1784.)

That the degree of precision of the discharge observations was much less than claimed by complainant. (Williams, Vol I, p. 737; Freeman, Vol. III, pp. 1178, 1187.)

That the accuracy of measurement was not sufficiently perfect to enable the detection of a variation of flow of 10,000 cubic feet per second. (Williams, Vol. II, p. 636; Freeman, Vol. III, pp. 1150, 1186-1189); that the exclusion of the 1901 observations in the St. Clair River was in error. (Williams, Vol. II, p. 643), and that including these the amount of diversion necessary to lower the lake one foot would be increased seventeen per cent. (Williams, Vol, II, p. 639), and that the influence of Lake St. Clair could not be ignored. (Williams, Vol. II, p. 639; Stearns, Vol. II, p. 1031; Freeman, Vol. III, p. 1149.)

That the Niagara discharge was inconsistent with those of the St. Lawrence, St. Clair and Detroit Rivers, and inconsistent with the physical characteristics of the several drainage areas. (Williams, Vol. II, pp. 671-737; Stearns, Vol. II, pp. 1014, 1020-1024, 1105; Freeman, Vol. III, pp. 1178-1180.)

That the improvements for navigation in the St. Clair and Detroit Rivers had lowered the level of Lakes Michigan-

Huron and St. Clair by greater amounts than the contemplated diversion at Chicago would do, thus indicating that keeping the lake surfaces at a high level was of secondary importance from a navigation standpoint. (Williams, Vol. II, p. 705; Stearns, Vol. II, pp. 1015, 1017; Freeman, Vol. III, pp. 1166, 1172; Cooley, Vol. III, p. 1783.)

That the improvements in the Niagara River had lowered the level of Lake Erie (Cooley, Vol. III, p. 1783), and that similar work in the St. Lawrence River had lowered the level of Lake Ontario. (Williams, Cross Examination, Vol. II, p. 823; Cooley, Vol. III, p. 1783.)

That the navigation improvements now substantially completed had been planned with a view to providing for the effects of a diversion of 10,000 c. f. s. (Ripley, Vol. III, pp. 1301, 1303); and that any lowering by such diversion could be compensated for by obstructions in the channels connecting the lakes without detriment to navigation. (Freeman, Vol. III, pp. 1172-1174; Ripley, Vol. III, pp. 1311-1313; Williams, Vol. II, pp. 742-743.)

Gardner S. Williams, the principal witness for defendant, on cross examination, testified (Vol. II, pp. 747-750) that a diversion of 10,000 cubic second feet at Chicago would not affect the levels of the different lakes more than the following:

Lakes Michigan-Huron	4.1 inches
Erie	3.5 inches
Ontario	4 inches

For a diversion of 14,000 cubic seconds feet, (Vol. II, p. 742)—

Lakes Michigan-Huron	5.7 inches
Erie	4.9 inches
Ontario	5.6 inches

AVERAGE DISCHARGES OF THE VARIOUS OUTLET RIVERS OF THE GREAT LAKES.

St. Mary's River	1900-1904	76, 060 cubic feet per second. (Williams, Rec., Vol. II, p. 683.)
St. Clair River	1900-1907	197,633 cubic feet per second. (Williams, Rec., Vol. II, p. 670.)
Niagara River	1900-1907	200,072 cubic feet per second. (Williams, Rec., Vol. II, p. 670.)
St. Lawrence River	1900-1907	247,762 cubic feet per second. (Williams, Rec., Vol. II, p. 674.)

Plaintiff's rebuttal evidence on hydraulics of the Great Lakes.

The plaintiff in rebuttal produced some of the witnesses that it had presented in its evidence in chief, and some other witnesses employed by the United States Lake Survey. These rebuttal witnesses testified and concluded:

That the methods of determining the amount of diversion to produce a lowering of one foot on the several lakes by the defendant were incorrect, particularly as applied to the Niagara River. (Ray, Vol. V, pp. 2797, 2798, 2799, 2802, 2804; Moore, Vol. V. p. 2877; Shenehon, Vol. V, pp. 3130-3149.)

That the several quantities of diversion required to produce a lowering of one foot on the several lakes as originally presented were incorrect for the St. Clair and St. Lawrence Rivers, which would be 21,500 and 21,125 cubic fee per second, respectively. (Ray, Vol. V. pp. 2793, 2795; Moore, Vol. V, pp. 2869, 2912; Richmond, Vol. V, p. 2946.)

That a new gaging section had been measured on the Niagara River and that the discharges observed there agreed closely with those at the previously measured locations. (Haskell, Vol. V, p. 2666; Ray, Vol. V, p. 2848; Richmond, Vol. V, pp. 2943, 3013; Shenehon, Vol. V, p. 3143.)

That the discharge of the several lakes at the several gaging stations were controlled by the elevations of the lakes a few minutes before the time of the discharge observation, to wit:

For Lake Huron, Section Dry Dock, sixteen minutes. (Richmond, Vol. V, p. 2948.)

For Lake Erie about eight minutes. (Shenehon, Vol. V, p. 3136); Moore, Vol. V, p. 2874; Ray, Vol. V, p. 2797.)

For Lake Ontario about two and one-fourth hours. (Ray, Vol. V, p. 2804; Shenehon, Vol. V, p. 3137.)

That its time limit is established by the "time interval for a crest of stage to advance" from the lake gage to the section. (Ray, Vol. V, p. 2798). That based upon observations of the "time interval for a crest of stage to advance" in the Sanitary and Ship Canal between Willow Springs and Lemont (Moore, Vol. V, pp. 2880, 2883), it would be possible by opening the gates at the controlling works to increase the flow from 4,167 to 10,000 cubic feet per second at Lake Michigan in two hours and twenty-five minutes, or certainly within three hours. (Ray, Vol. V, p. 2815; Moore, Vol. V, p. 2883.)

For 10,000 second feet diversion the witnesses for plaintiff who testified in rebuttal, found the lowering effect of the 10,000 second-feet diversion at Chicago on the different lakes to be as shown by the following table:

Ref. No.	Witness	Michigan and Huron	Ref. Record	Erie	Ref. Record	Ontario	Ref. Record	
12	Haskell	6.3	V-2663	5.5	V-2662	4.3	V-2727	
13	Ray	5.5 6.7	V-2810 V-2853	5.5	V-2810	5.1 5.6	V-2810	
14	Moore	5.5 7.0	V-2869	5.7 5.5	V-2867	5.2	V-2869	
15	Richmond	5.3	V-2946	5.6	V-2945	5.7	V-2946	
16	Hayford			5.5	V-3091		V-3358	
17	Shenehon	5.7 6.0	V-3142	5.5	VII-725	5.5	V-3159	By Stream Measurements
18	Shenehon	8.2	V-3140			6.4	V-3140	By Method of Fluctuations
19	Shenehon	6.6	II-669			6.4	II-670	By Method of Fluctuations*

* Using ratios derived by defendant's witness, Mr. Gardner S. Williams, but based on 5.5 inches for Erie.

Note—The greater lowerings indicated for Ontario are based on additional measurements made since the earlier testimony; and the same is true in part for Michigan-Huron.

Sur-rebuttal, hydraulic evidence of defendant.

Defendant's sur-rebuttal hydraulic expert witnesses testified and concluded as follows:

That the time required to establish a flow of 10,000 cubic feet per second through the Sanitary and Ship Canal, starting with a flow of 4,167 cubic feet per second was in excess of twenty hours, as demonstrated by experiment, (Wisner, Vol. VI, pp. 3415, 3419; Williams, Vol. VI, pp. 3536, 3537; Cooley, Vol. III, pp. 1788, 1801), and that the full effect of a change of flow was not coincident with the "crest of stage advance" but occurred many hours later, in the said canal, by actual observations. It therefore follows that the assumption upon which the discharges and lake stages had been connected by the plaintiff was erroneous, and the increments or effects of diversion so derived were very greatly in error. (Williams, Vol. VI, p. 3537; Cooley, Vol. III, p. 1773.)

Also, that the position of the meters in gaging the Niagara River at the International Bridge was not that computed by the complainant but further downstream in a larger cross section than that to which the meter registration was applied, and hence the discharge computed was materially too small. (Williams, Vol. VI, pp. 3521, 3531.)

Plaintiff's evidence on damage to commerce on Great Lakes due to the lowering of lake levels on account of the Chicago Diversion.

Plaintiff produced with reference to this subject, in addition to some of the witnesses who testified as to the amount of the lowering effect upon the lakes surfaces due to the Chicago diversion—Mr. Harry Coulby, president of the Pittsburgh Steamship Company (Vol. I, pp. 428-445); William Livingston, president Lake Carriers Association (Vol. I, pp. 200-209).

Plaintiff's witness Eben S. Wheeler (Vol. I, p. 91) states the theory upon which plaintiff's witnesses rely to deduce the damage claimed to commerce.

> "I have said in my notes that lowering means that a definite amount of diversion at Chicago will make the surfaces of Lakes Huron and Michigan a definite amount lower at all times and places than it would have been if the diversion had not taken place. Perhaps I have given too long an answer, the actual elevation of the surfaces of the lakes at any time is the algebraic sum of all the causes which tend to change the elevations. Some of the most important of these causes are rainfall, outflow, evaporation, etc. If two causes, producing opposite effects, are operating at the same time then the actual effect produced will be of the same kind as the larger one, and the amount will be the difference between the two causes. For example, a merchant deposits a thousand dollars each week, and checks out fifty dollars each day, his balance is lowered by the amount he takes out and raised by the amounts he deposits, and in this case the deposits are larger than the withdrawals, therefore his balance will be raised by the difference between the two. At the end of the week it will be raised $650, notwithstanding it was lowered $350 by his withdrawals. Similarly, if for the period, we will say, from 1900 to 1908, the rainfall was greater than the outflow, and evaporation, the lake would rise. This appears to have been the case, notwithstanding the outflow for the period was increased by the diversion at Chicago. A cause which tends to lower the lake itself actually does make the lake lower than it would have been without the cause. I do not know but my answers are a little too long."

Plaintiff's theory is further stated by F. C. Shenehon (Vol. I, p. 286):

> "Lowering is referred to the lake surface which would have prevailed in the absence of the diversion; that is, the lake may actually rise, while this lowering is going on at the same time, in just the same way that a man who is on a railroad train traveling East may reach the tail end of the car he is in by walking westward. It is a case of two movements going on at the same time. This lowering is going on, and it is independent of the other fluctuations that may prevail at the same time."

William Livingston, president of the Lake Carriers Association, stated (Rec. Vol. I, p. 201) that between Buffalo and points in Lake Superior, the depth to which a boat could load could be determined by the depth of water on Ballard's Reef in the lower Detroit River, the reason being that the water crossing Ballard's Reef is a little shoaler than the Lime Kiln Crossing and at Bar Point. If there was another harbor which was shoaler than Ballard's Reef, it would be necessary to take that into consideration, but witness did not know of any; that in loading in Lake Superior the depth at Poe Lock is also taken; that the engineer at Poe Lock keeps a constant gage of the water there; that it does not make any difference if you load to 100 feet outside—the shoalest spot is the one that governs; that the last eight years (Rec. Vol. I, p. 202) has worked a sort of revelation; (He was testifying in May, 1909) in the size of vessels built and operating on the Great Lakes; that approximately seven years ago the steamer A. B. Wolvin was built; that she was the largest vessel on the lake, carrying 3,500 tons more than the next largest vessel; that vessels which have been built since that time, except those built for some specific traffic, say for packing freight, have all been built of her type; that the smallest boat that is built now for business purposes will not run under 7,500 to 8,000 tons; that we have some boats that will carry 12,000 gross tons; that when a boat is loaded to 18 feet or more, the average per inch is 80 to 100 tons; that (Vol. I, p. 204) there are 600 boats that belong to Lake Carriers Association, which is the cream of the carrying capacity on the lakes; that not all of those boats would be affected by the lowering of the lake levels an inch; that about seventy per cent of these boats would be affected; that there are seventy-three ships in the Pittsburgh Steamship Company fleet carrying ore; that these load to nineteen feet, eighteen of them, however, may load to twenty-one feet; that the loss to the ships of the Lake Carriers Association (Vol. I, p. 205) would be over $85,000 per inch, or $500,000 per inch per year for the entire seventy per cent; that the total loss to commerce would be about one-eighth more;

that this would cover the boats not in our association; that larger vessels are being built right along (Vol. I, p. 207) and all the modern vessels could load considerably deeper if the shoalest spots would admit of it; (Vol. I, p. 210); that if the witness or any one else had predicted ten years ago boats would be built of the size of the Wolvin and the present line of boats being builded, that man would have been considered a fit candidate for a medical asylum.

Harry Coulby, president of the Pittsburgh Steamship Company testified (Vol. I, p. 428):

That Pittsburgh Steamship Company boats are engaged principally in carrying ore, coal and sometimes grain between Two Harbors, Duluth, Superior, Ashland, Marquette, Escanaba and the Lake Michigan ports, Milwaukee, South Chicago, Chicago, Gary and to all lower lake ports such as Cleveland, Buffalo, Erie, Conneaut, Ashtabula, Fairport, Lorraine, Huron, Sandusky and Toledo; that the company owns 106 vessels and employs or charters 100 more during the season; that there are 61 of these vessels that are capable of loading to twenty feet or more; that the depth to which boats going to Lake Superior may load is determined by the depth of water at the Poe Lock at Sault Ste. Marie; that as to those boats which are not going to Lake Superior, Ballard's Reef and the shallow waters across Lake St. Clair determine the depth; that the present depth at the time of testifying (July 8, 1909) was nineteen feet three inches at the Poe Lock and twenty feet Ballard's Reef, and the shoals of Lake St. Clair; that the large vessel makes about twenty-five trips a season; (Vol. I, p. 431); that every time you reduce the carrying capacity of a boat, you reduce the earnings that much without reducing the operating cost; (Vol I, p. 432); that all the harbors have been dredged out to take care of the ships that come over what the witness calls the "necks of the bottle"—that is, the Poe Lock and Ballard's Reef; that the harbors along the south shore of Lake Erie would be affected by lowering of the water surface; that each

inch of loss of depth on the sixty-one ships affected of the Pittsburgh Steamship Company's fleet, assuming twenty-five trips for each boat per season, and 100 tons for each inch loss of depth per boat per trip, causes a loss in total carrying capacity per inch of 152,000 tons per season; that 12 ships of the 61 may load to 25 feet. (Vol. I, p. 434.)

Cross Examination.

Pittsburgh Steamship Company corporation of West Virginia, and its stock is owned by the United States Steel Corporation; it carries ore for the United States Steel Corporation only.

The report of the Board of Engineers on Waterways from Lockport, Illinois, to the mouth of the Illinois River, dated August 15, 1913, (Rec. Vol. IV. p. 2587) signed by two of the plaintiff's witnesses, states the plaintiff's claims of damage to commerce:

> "The largest lake freighters recently built carry over 80 short tons of freight for each inch of loaded draft, and an uncompensated Chicago diversion of 10,000 second feet would cause a loss to each vessel of at least 446 tons in carrying capacity for each down trip through the channels connecting with Lakes Michigan and Huron. This, based upon 25 trips per season, with vessels returning light, means a loss of at least 11,150 tons per year, and at a freight rate of 55 cents per ton represents a monetary loss of at least $6,000 per large vessel per year. During the season of 1912 there passed through the locks at Sault Ste. Marie over 72,000,000 tons of freight, the greater part of which was carried in vessels of such size as to be affected by any loss of depth caused by a Chicago diversion. The tonnage of 1913 bids fair to exceed the tonnage of 1912. The lowest estimate of the loss to American vessels alone that has been brought to the attention of the Board is over $1,000,000 per annum, and the loss will increase with the increase in the number and size of vessels."

Defendant's evidence relating to damage to commerce, assuming a lowering of lakes surfaces due to the Chicago diversion.

Major Charles Keller, one of the witnesses for the plaintiff, made a study of this question, a report of which is contained in the report of the Board of Engineers entitled "Waterway from Lockport, Illinois, to the mouth of the Illinois River," dated August 13, 1913, and made pursuant to the Rivers and Harbors Act of June 25, 1910. The report of Major Keller contains the following (Rec. Vol. IV, p. 2608):

> "6. With the outlets free of ice at any instant the volume of water discharged from one of the lakes is a definite quantity fixed by the level of the lake. With a constant supply of water and constant evaporation there would then be no change in the elevation of the lake's surface, except such temporary changes as might be caused by winds and barometric disturbances. But the flow into each lake is, as has been explained, constantly varying, and while the discharge from the lakes is also ever changing, so as in the long run to tend to counterbalance changes in supply, yet these adjustments of supply and discharge are not simultaneous,and the surface levels of the lakes are therefore, constantly fluctuating, as is readily seen from the plates attached.
>
> 7. These regular but uncontrollable changes in lake level mask the effect produced by an artificial diversion."

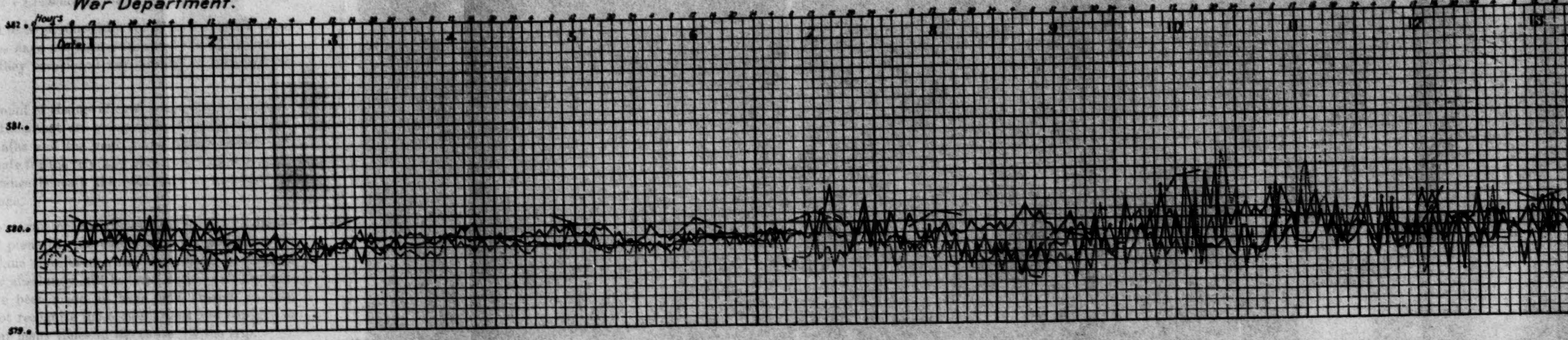
The plates referred to in the above quotation show hourly gage readings at different gaging stations, indicating the changes in surface elevations of Lakes Michigan and Huron for different months. Opposite is, as an example, one of these plates covering the month of August, 1911, (Rec. Vol. IV, p. 2653):

Lyman E. Cooley, whose qualifications as a witness for the defendant have been heretofore stated, testified (Rec. Vol. III, p. 1776):

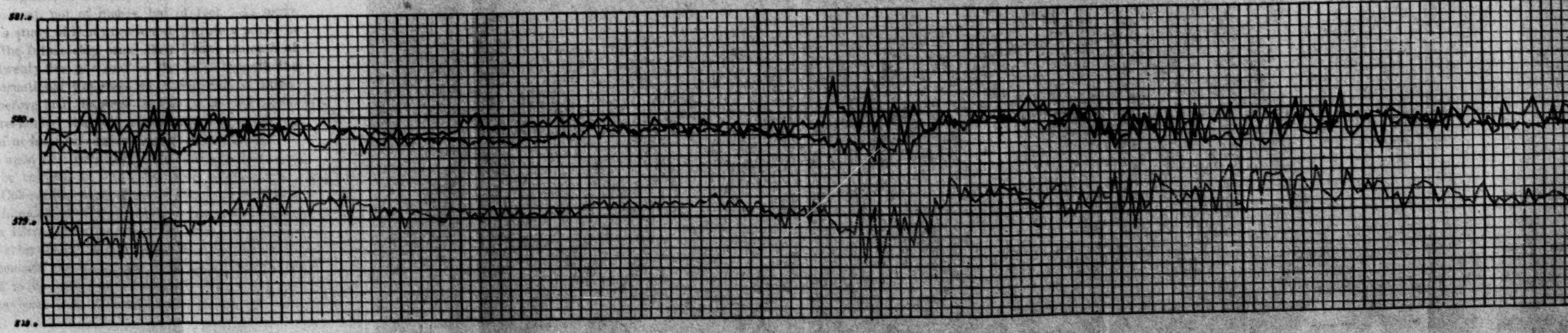
In my opinion lowering of the levels of Lakes Michigan and Huron five to six inches, Erie somewhat less, Ontario somewhat less than Erie, would cause no injury to navigation. The changes which have been made which influence the lakes' levels since the improvement of lakes' channels was undertaken, exceed in several instances all the changes pro-

War Department.

Automatic Gage Readings at C

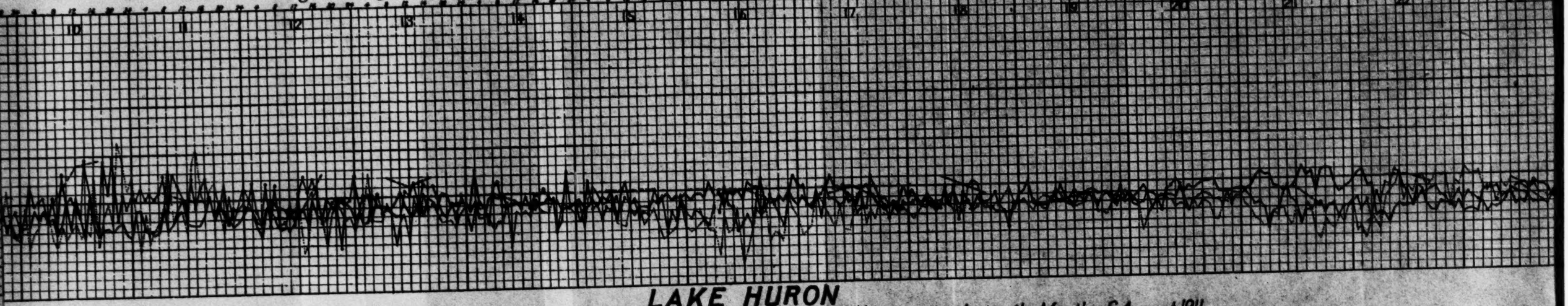


Automatic Gage Reading



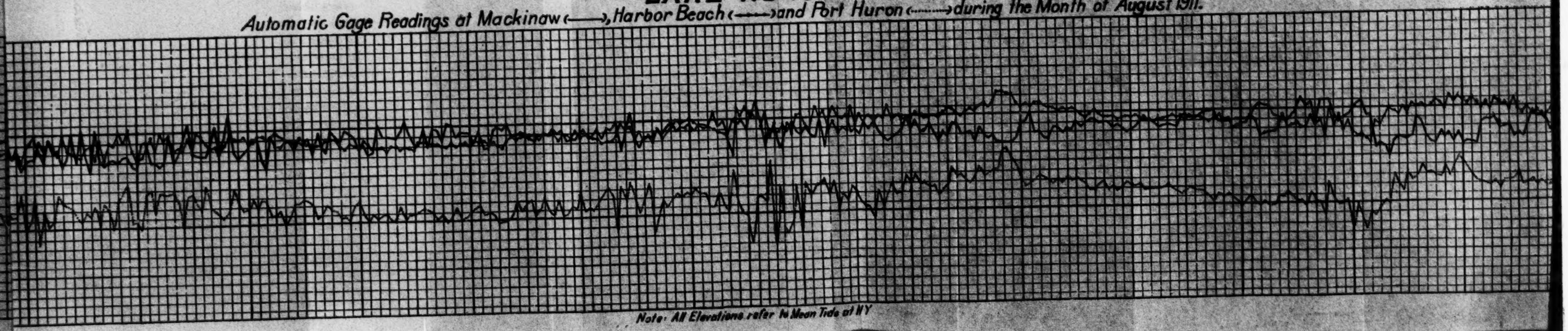
LAKE MICHIGAN

Automatic Gage Readings at Chicago (.....), Milwaukee (- - -), Grand Haven (- · -) and Mackinaw (——) during the Month of August 1911.

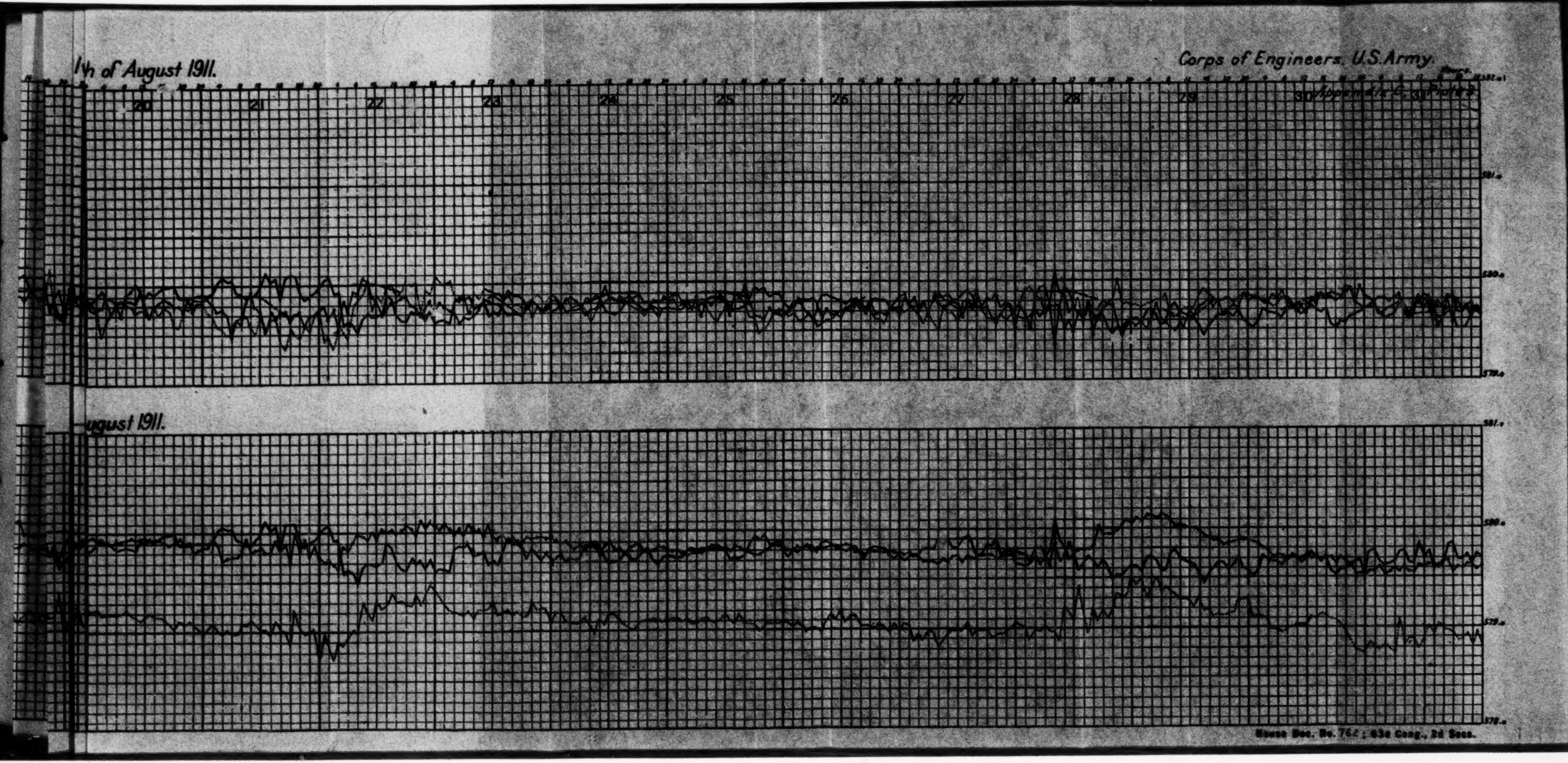


LAKE HURON

Automatic Gage Readings at Mackinaw (——), Harbor Beach (- - -) and Port Huron (.....) during the Month of August 1911.



Note: All Elevations refer to Mean Tide at NY


Corps of Engineers, U.S. Army.
1th of August 1911.
20
21
22
23
24
25
26
27
28
29
30
31
581.0
580.0
579.0
ugust 1911.
581.0
580.0
579.0
578.0
House Doc. No. 762, 63d Cong., 2d Sess.

duced or alleged to be produced by the diversion at Chicago, and such changes have not been considered worthy of attention, nor have they occasioned any protest or comment by lake carriers.

Again, the amount of change alleged is nominal in comparison with fluctuations that are going on by hour, by day, and through the months and the year. And vessel owners are obliged to load safe for the trip, and give a very much greater margin of clearance beneath the boat than is indicated by the alleged change.

Again, it is not competent to estimate the effects as a diminution in a fixed plane of reference, or as the difference between a fixed plane of reference and the bottom, as made in a canal or other absolutely still body of water; and the estimates that have been made up have been framed on that basis, and do not recognize these oscillations and changes in level which occur many times in the course of the trip.

Again, it is recognized as sound practice to provide a margin beneath the boat, not of inches, but of feet. As early as 1888 I made a study of that question and wrote a paper to the effect that the future ship canal should have a depth of not less than twenty-five per cent of its draft beneath the keel. The International Congress on Navigation at Philadelphia, year before last, declared as one of the principles which govern restricted channels and canals, that it should have a depth of at least one meter beneath the keel, depending, of course, upon the character of channel and the speed which was to be considered. And the same proposition is worked out by Colonel Black, an engineer officer of the United States Army (later Chief of Engineers) in his recent report on the Hudson River. Colonel Black lays down the proposition that the river should have a depth of two or three feet of clearance beneath the boat, and gives some remarkable data in regard to the effect of the Hudson River boats attempting to navigate with the restricted limit beneath the

boat, and also for the further reason that any item of cargo that would fall off the boat, like a barrel of cement, would roll the skin and frame out of the bottom of the boat if it happened to strike it. There should be enough clearance there for safety. I know from my own experience in navigation on western rivers, that a boat that would attempt to run within a foot or two of the bottom would be utterly uncontrollable in passing through the channelways of the lakes. So that a mere margin of a few inches would not be thought of by practical navigators; would not be accounted for and would not be known to exist, in the absence of a specific knowledge of a diversion of something of that kind existing at Chicago.

On the other hand, a lowering of the lakes by one foot, better by two feet, would be a profound advantage to every lake city about the Great Lakes, in giving a better freeboard for its sewer system and better elevation to its docks. All the cities about the lakes are built on low ground, margining some creek originally awash at high water of the lake, and the benefits of such a lowering to the sanitary welfare of the cities about the Great Lakes would be so great in proportion to the cost of producing two feet additional depth in all the harbors and channels of the lakes, that it would be a vanishing quantity. And, furthermore, I conceive that if there were not diverse jurisdictions in the matter, but were one jurisdiction that looked at public welfare as a whole, a proposition of that kind would be a proposition to at once elicit legislative attention.

Isham Randolph, a resident of Chicago, a civil engineer, a contemporary of Lyman E. Cooley, for a number of years Chief Engineer of the Sanitary District of Chicago, later its Consulting Engineer, and at one time a member of the Isthmian Canal Commission, testified as follows (Rec. Vol. VI, p. 3595):

In the report of the Board of Engineers on Deep Waterways from the Great Lakes to the Atlantic, 1901, p. 219, (Rec. Vol. IV, p. 2390), it is stated:

> "The speed attained by a ship in open sea will be reduced to a marked degree on entering shoal water, even of unlimited width."

On page 220 of the same report:

> "Retardation in shoal water. * * * Observations made recently on the freight steamship Angeline, in the deep water of Lake Huron and the shoal water of Lake St. Clair, indicate that the retardation is about 18 per cent. (Note, the Angeline is 414 feet long and 51 feet beam; was built in 1899.) The depth under the keel was about 2 feet 10 inches, no allowance being made for settlement of the ship in the water which always occurs when the water is shoal.
>
> The Senator (410 feet by 45 feet) is also cited with a loss of 16 per cent. in Lake St. Clair. This Commission provides for two feet of depth below the keel of vessels for which they designed a channel."

Kent's Engineers' Pocket Book, 1900 Edition, treats of this subject on page 1007. (Rec. Vol. VI, p. 3596, 3597.)

> "The Medusa, a third class cruiser, length 265 feet, beam 45, draft 16 feet 6 inches, displacement 2,880. Indicated horse-power for ten knots per hour, 700; for 14 knots per hour, 2,100; for 18 knots per hour, 6,400; for 20 knots per hour, 10,000.
>
> Atlantic passenger steamer 525 feet long, 63 feet beam, mean draft on trial 21.3, displacement 11,550 tons; indicated horse-power 10 knots per hour, 2,000; for 14 knots per hour, 4,600; for 18 knots per hour, 10,000; for 20 knots per hour, 14,500.
>
> The Medusa's figures for 20 knots are from the trial in Stokes Bay and show the retarding effect of shallow water. The figures for the other ships for 20 knots are estimated for deep water."

Here we have an example of two vessels, one having a displacement of about four times that of the other. The larger requiring in deep water only forty per cent more power to

give it twenty knots speed than was required to give the smaller vessel the same speed in shallow water.

On pages 34 and 35, Colonel Black says: It is believed that the minimum clearance allowable for safe navigation in the Hudson River is two feet. In Germany, the clearance adopted as safe is one meter (39 inches).

Captain Marshall states in the report of the Chief of Engineers for 1893, Appendix LL, pages 2798, 2799, in discussing the clearance over tunnels under the Chicago River (Rec. Vol. IV, p. 2370): "There should be at least two feet between the bottoms of vessels and the crowns of the tunnels to guard against chance obstructions of small extent lodging temporarily over the ridges crowns."

The witness further stated:

I am of the opinion that the amount of water that should be under the keel of a boat is a matter of feet rather than inches. If there were three feet under the keel and the depth was decreased so that there were six inches left, the effect upon navigation would be in loss of speed and increased consumption of coal on a trip from Lake Superior to Cleveland, considering the shallow places in the St. Clair and Detroit River. The increased consumption of coal under such conditions would be negligible and it must be borne in mind that through those channels the heavy loads are going with the current and they come light up-stream.

Joseph Ripley, for a great number of years in the employ of the United States Engineer Corps, and whose qualifications as a witness for the defendant have been heretofore stated, testified as follows, July 24, 1913, (Rec. Vol. III, pp. 1304, 1305):

The elevation of the floor of the Poe Lock is 562.37 above sea level. The lower mitre still is located opposite the gate recesses of the lower gate and the intermediate gates. The floor of those recesses is a foot and a half lower than the

general floor of the lock. The mitre sill is either four-
1305 teen or sixteen inches in height. Below the mitre sills for the intermediate gates and also for the lower lock gates, are platforms built of 12x12 timbers; the platforms being, as I remember it, some thirty feet along the axis of the lock. Below the lower guard gates, a platform was built which is .33 of a foot, or about four inches higher than the floor of the lock. The Poe Lock was opened for navigation in August, 1896; but the depth over the mitre sills was not available to navigation purposes until the spring of 1898 as the sill and platform for the movable dam located across the canal about 3,000 feet west of the Poe Lock was left in place until that time, and on that guard gate sill, the depth was only seventeen feet.

The opening of the West Neebish Channel in 1907 made the Poe Lock the critical place as to the depth of water for navigation purposes in the St. Mary's River, which has been the case since that time. The platform of the Poe Lock is the critical place, that is, the one I describe below the guard gates. The platform was placed for the purpose of protecting the lower mitre sill of the lock, but is really of no value because the platform directly below the sill could be utilized for that purpose, and that would not necessarily be any higher than the general floor of the lock. This platform could be removed at a cost of not exceeding $10,000 in the
1297 winter season without interfering with navigation.

In making improvements on the Great Lakes, a reference plane was fixed which was a certain elevation above sea level. This reference plane for an improvement is fixed by the engineer officer at Detroit upon recommendation of his assistants, and this reference plane becomes a matter of record in
1298 the Department. Prior to 1903 the improvements in the channels of the Great Lakes were referenced to a water surface assumed to be 584.37 above sea level at the foot of the St. Mary's locks and 581.47 at Mud Lake. This was the reference plane. In the 1903 project, however, the improvements were here referenced to an assumed water surface of 580.37

above sea level below the locks and 578.77 in Mud Lake, the variation between those points corresponding to the slope of the river. These were the reference planes for the
1299 improvements. When the channel improvements are made, it is provided that they shall have a depth of a certain number of feet below the reference plane. The reference plane for the 1903 project improvement in the St. Mary's River was fixed when the project was prepared. The depth of the improvement of course had to be
1300 stated so it would be incorporated in the Act of Congress authorizing the improvement, and as the prior improvements had been referenced to the mean stage of water as determined in 1870, and the water at times was below the mean stage, it would not provide navigation for the implied depth of the improvement. As the department had ruled that for appropriations made along the sea coast the depth should be referenced to low tide, I urged Major Bixby to reference the improvements in St. Mary's River to the lowest stage of water we had, or the probable lowest stage that we would have, and with his approval I prepared the grade plane as stated. This was in 1902. Major Bixby was at that time the engineer officer in charge at Detroit. I gave consideration to the probable lowering of the Lake Huron water surface due to the Chicago diversion, as indicated by the reports with reference to the gagings of the St. Clair River made by
1301 Louis C. Sabin, a witness for the plaintiff. The Chicago Canal had been opened at that time, and the gagings of the St. Clair River had been made and some discussion had been had with reference to the amount of the lowering which would be caused by the diversion by the Chicago Drainage Canal. I had discussed this matter with Mr. Eben S. Wheeler, Major Bixby and my assistant, Benno Rohnert. In fixing the plane, I intended that if we had an improvement for
1302 twenty-one feet that that twenty-one feet should be available for navigation on all occasions during the navigation season. The reference plane which I prepared was the one used for the 1903 project improvements in the St.

Mary's River and its lower channels. I fixed a different reference plane than I would have fixed had there been
1304 no diversion at Chicago. Under the 1903 navigation improvement project excavations and dredging were made in the channels of the St. Clair and Detroit River at different points. In 1901 some improvements were made for a twenty foot depth, reference plane being 571.5 above sea level. In 1904 improvements were made in the Detroit River for a twenty-one foot depth. The reference plane, however, for that was fixed at 571.0 feet above sea level.

Francis C. Shenehon, one of the plaintiff's hydraulic witnesses, stated that there are records of Lake Erie rising as much as eight feet in about eight hours (Rec. Vol. V, p. 3176); Lake Michigan as much as five feet in a very short time.

Herbert Charles Sadler, witness for the defendant, July 15, 1913, (Rec. Vol. III, p. 1240):

Residence Ann Arbor, Michigan; Professor of Naval Architecture and Marine Engineering, at University of Michigan, since 1900; educated at Dulwich College, England, and at Glasgow University, Scotland, latter degree of Bachelor of Science in Engineering in 1893; Doctor of Science from same U. in 1902; 1890-1896 engaged in practical shipbuilding on the Clyde; 1896-1900 Assistant Professor of Naval Architecture and Marine Engineering at Glasgow U., and during that time associated with Prof. Biles in consulting practice; 1901-1904 appraiser for the vessel properties in connection with the Michigan Railroad appraisal; appraised the vessels owned by the Duluth, South Shore & Atlantic in 1912; consulting naval architect for the City of New York in connection with municipal ferries; also for Great Lakes Engineering Works having one of the largest ship yards on the Great Lakes. Last two years acted as consulting engineer (testifying in July, 1913) for the Tow Boat Board of United States Army Engineers Corps, the Board consisting of Lt. Col. Lansing H. Beach, Major Charles Keller, and Col. Newcomber; con-

sulting naval architect for the White Star Line of Detroit; for the Detroit & Cleveland Navigation Company and for the Hudson River Day Line, New York.

1243 *He testified as follows*: The freight per year of all kinds on the Great Lakes, exclusive of package freight—that is Lake Superior, Huron, Michigan, Erie—freight that is carried through the St. Mary's Falls Ship Canal and the St. Clair and Detroit Rivers, as shown by the statistical report for 1912, is 72,472,676 tons, the ore tonnage being between forty and fifty millions; wheat 5,220,000 tons; coal 14,-
1244 900,000. The ships carrying this ore are 440x52x28 feet, 550x56x31 and 605x58x32 feet; first class 440 feet—there are 151 boats; 550 feet class, 93; 605 feet class, 73; 440 feet class are designed to be loaded to 19 feet; 550 feet class to 19 feet and the 600 feet class to 19 feet. It might be possible to load the two larger types to somewhat deeper draft.

The cost of constructing new boats to have the same carrying capacity with a less draft of one, two, three, four, five or six inches, has been estimated. 440 feet class, loss in
1245 capacity for 1 inch draft, 55 tons, would require an increase in length of about 2.1 feet for each inch; increased cost of vessel, $1,000; interest and depreciation, $100. For 3 inches less draft, increase in cost would be $3,000; interest and depreciation about $300. For 550 feet class, loss in capacity for 1 inch less draft, 70 tons; increase in length required to take care of this, would be 2.9 feet; increased cost of vessel $1,700; interest and depreciation, $170; for 3 inches loss the increased cost of vessel would be $5,100; interest and depreciation, $510; for the 605 feet class, loss in capacity for 1 inch would be 81 tons; increased length 3.1 feet; increased cost of vessel $1,800; interest and depreciation $180; for 3 inches loss in draft, increased cost of vessel $5,400; interest and depreciation $540. The three classes men-
1246 tioned carry about 70 per cent of the total of ore, coal and wheat; 48 per cent by the first class; 26 per cent by the second, and 26 per cent by the third. The cost of operating

the boat designed of the greater length to take care of the decrease in draft, would be no more than vessels con-
1247 structed in the present manner. All of the 500 and 600 feet class of boats have been built and put in service in the last 13 years; that is, since 1900. The 500 and 600 feet classes are the only boats that are designed to be loaded
1248 to more than 19 feet draft.

The cost of building the 93 vessels of the 500 feet class to take care of loss in draft of 3 inches, would be $1,404,300, and the 73 vessels of the 600 feet cost $1,197,200. These amounts represent the actual cost of construction and
1250 the capitalized interest and depreciation amount.

The cost of transporting tonnage carried by the vessels of the 500 and 600 feet classes for each inch of loss of draft is 0.116 cents per ton per inch. For the 73 vessels above
1251 mentioned for 3 inches of loss of draft, the loss would be per year, $42,480. for 15 trips, $56,700 for 20 trips and $70,950 for 25 trips; for the 93 vessels above mentioned, the loss would be for 15 trips, $49,950; for 20 trips, $66,390; for 25 trips, $82,860. Capitalizing these yearly amounts, the estimate of total loss, is 15 trips, $1,848,600; for 20 trips, $2,-461,800; for 25 trips, $3,076,200 loss. It is estimated that 37 million tons were carried by these two classes of vessels
1252 for the year 1912. The loss per year would be for 3 inches, $128,760. Capitalizing this at 5 per cent, equals $2,575,200 as the total loss.

Henry C. Adams (Rec. Vol. III, p. 1354; September 25, 1913), a witness for defendant:

Resides Ann Arbor, Michigan; Professor of Political Economy & Finance, University of Michigan, since 1887; prior to that time lectured Cornell U., Johns Hopkins and Michigan; in 1888 and until 1907 was statistician to the Interstate Commerce Commission; 1910 had charge of what is known as the determination of the intangible values of the Michigan Valuation of Railroads; was going to China shortly

as advisor to the Chinese Government as to standardization of Chinese Railway Accounts.

The witness testified as follows: I have examined the testimony of Mr. William Livingstone, witness for the plaintiff. He has computed the annual loss to commerce on the Great Lakes, assuming a depreciation of the normal lake level of 6 inches, to be $4,387,500. I think he is incorrect in this for he has multiplied the loss of load by the rate for carrying the ore, without taking into consideration the increased expense incident to that increased freight carried. Furthermore, this is incorrect in that the average number of
1372 trips for all vessels is 11.6, instead of 20 round trips, testified to by Mr. Livingstone, and 25 round trips, as testified to by Mr. Coulby. I agree with Mr. Livingstone, however, that the damage is confined to those boats
1376 carrying ore or to the ore traffic. I find that the average round trip for those boats loading to beyond 18.1 feet passing through the St. Mary's Falls Ship Canal, is 14.12 per year.

Joseph Ripley, witness for the defendant, whose qualifications have been heretofore stated, July 24, 1913, (Rec. Vol. III, p. 1306), testified as follows:

The cost of deepening the channels of the St. Mary's River, St. Clair, the channel in Lake St. Clair and those of the Detroit River, 4 inches or 8 inches, would be, for 4 inches, $163,990; 8 inches, $403,854. The cost for deepening in inches intermediate would be proportional. Including (p. 1307) the channels connecting the Great Lakes, the harbors of the United States and Canada, the cost of deepening 4 inches is $2,163,454; 8 inches is $4,405,008; capitalized maintenance for 4 inches, $728,510, and for 8 inches, $1,092,766 capitalized.

CHRISTIE EXHIBIT II, APRIL 26, 1923.

Table I.

Table Showing Movement of Iron Ore During 1920
Compiled from Part 2 of Chief of Engineers, U. S. Army Report, for Fiscal Year Ended June 30, 1921 (Rec. Vol. VIII, p. 220).

Page	Harbors	Shipment-Tons	
1001	Duluth, Minn.	33,771,582	
1008	Ashland, Wis.	9,162,554	
998	Agate Bay, Minn.	10,391,879	
1017 } 1018 }	Marquette, Mich.	3,824,921	
1030	Escanaba, Mich.	7,361,069	
			64,512,005 Tons

Page	Harbors	Receipts-Tons	
1054	Milwaukee, Wis.	144,500	
1096	Calumet, Wis.	7,275,558	
1098	Indiana Harbor, Ind	1,426,983	
1142	Rouge River, Mich	910,987	
1143	Toledo, Ohio	2,982,102	
1151	Huron, Ohio	1,534,615	
1153	Lorain, Ohio	4,508,600	
1155	Cleveland, "	8,957,165	
1158	Fairport, "	1,397,719	
1159	Ashtabula, "	12,351,940	
1161	Conneaut, "	6,708,534	
1164	Erie, Pa.	2,484,897	
1170	Buffalo, N. Y.	8,577,923	
1174	Tonawanda, N. Y.	602,695	
	Miscellaneous	3,368,048	
	Foreign Ports	1,279,739	
			64,512,005 Tons
	Memoranda		
	Lake Superior Shipments		57,150,936 Tons
1104	Passed 500—eastbound		56,780,498 "

Table II.

Comparison of Depths in Certain Channels and Harbors at Sundry Elevations of the Waters of Lakes Michigan, Huron, Erie and Superior, Compiled from Bulletin No. 31, "Survey of Northern and Northwestern Lakes," Issued by U. S. Lake Survey Office, Detroit, Michigan, April, 1922, and Water Level Records Furnished by same Authority. (Rec. Vol. VIII, p. 223.)

Page of bulletin	Channels		Project depths of acts of Congress standard low water	Actual depths assuming water surfaces at mean for 62-yr. period, 1860-1921	Depths at 1921 annual mean	Depths at 1921 annual mean lowest	Depths at 1911 navigation season mean low	Depths for lowest month for 1911 navigation season, lowest monthly mean
			Feet	Feet	Feet	Feet		Feet
308	St. Clair Flats Canal		20.00	22.32	21.70	*20.73	*20.87	*20.39
319	Livingston Channel		21.00	23.52	23.31	22.33	22.47	21.99
	Harbors	Lake						
75	Duluth, Minn.	Superior	20.00	21.79	21.63	21.00	21.28	20.43
68	Ashland, Wis.	Superior	20.00	21.79	21.63	21.00	21.28	20.43
165	Milwaukee, Wis.	Michigan	19.00	21.63	20.60	20.10	20.23	19.87
205	Calumet, Ill.	Michigan	21.00	23.63	22.60	22.10	22.23	21.87
210	Indiana Harbor, Ind.	Michigan	21.00	23.63	22.60	22.10	22.23	21.87
316	Rouge River, Mich.	Detroit River	21.00	23.52	23.31	22.33	22.47	21.99
375	Toledo, Ohio	Erie	21.00	23.52	23.31	22.33	22.47	21.99
369	Huron, Ohio	Erie	19.00	21.52	21.31	20.33	20.47	19.99
365	Lorain, Ohio	Erie	20.00	22.52	22.31	21.33	21.47	20.99
357	Cleveland, Ohio	Erie	23.00	25.52	25.31	24.33	24.47	23.99
353	Fairport, Ohio	Erie	19.00	21.52	21.31	20.33	20.47	19.99
351	Ashtabula, Ohio	Erie	20.00	22.52	22.31	21.33	21.47	20.99
349	Conneaut, Ohio	Erie	20.00	22.52	22.31	21.33	21.47	20.99
345	Erie, Pa.	Erie	20.00	22.52	22.31	21.33	21.47	20.99
326	Buffalo, N. Y.	Erie	21.00	23.52	23.31	22.33	22.47	21.99
	Elevations							
123	Lake Michigan		578.50	581.13	580.10	579.60	579.73	579.37
323	Lake Erie		570.00	572.52	572.31	*571.33	*571.47	*570.99
45	Lake Superior		600.50	602.29	602.13	601.50	601.78	600.95

NOTE.—Gages—Duluth—Milwaukee—Head of Detroit River—Cleveland.
1911—Lake Erie—Shenehan tables free flow less 10,000 C. S. F. Gage .14 foot higher.
1911—St. Clair Flats canal interpolated.

AFFIRMATIVE EVIDENCE ON BEHALF OF DEFENDANT, TO WHICH PLAINTIFF DID NOT INTRODUCE OR OFFER EVIDENCE IN REBUTTAL.

Compensating or regulating works to off-set for the lowering of lake levels and connecting channels of the Great Lakes.

July 12, 1920, the defendant filed a motion for a decree only enjoining it from diverting at Chicago in excess of 10,000 cubic seconds feet of water, on condition that it should defray the cost of building such compensating or regulating works as the United States or proper authorities might provide, to off-set for the lowering of the levels of the Great Lakes and their connecting channels, due to the Chicago diversion. As grounds of said motion, various facts were alleged. The motion was heard and denied by the Court upon the allegations of facts set forth in said motion, without the introduction of evidence in support of or in opposition to the issues raised. The motion and the facts alleged therein as grounds for said motion, have been heretofore set forth. See This Narrative, (p. 98).

Among other things, it was alleged in said motion that it was an undisputed fact in the record that it was feasible and practicable to construct compensating or regulating works to off-set for the lowering of the lake levels due to the diversion at Chicago, and **various portions of the record were referred to as sustaining this allegation, among others, the following:**

John R. Freeman, witness for defendant, civil engineer, whose qualifications have been heretofore set forth (Rec. Vol. III, p. 1173; This Narrative, p. 135), April 4, 1913, testified as follows:

Compensating works, called the Gut Dam, were built by Canada at the outlet of Lake Ontario. The probable effect of this dam was estimated by U. S. Engineers prior to the building and later found to be substantially correct. It raised

the level of Ontario greater than the estimated lowering that would result from greatest proposed diversion at Chicago. Also, at the outlet of Lake Superior, near the International Bridge, an obstruction was built. Its general effect was to raise the level of Lake Superior about six inches. At the outlet of Lake Erie compensation works were built near Black Rock and have had the effect of raising the level of the lake. A still more radical plan for raising the level of Lake Erie was presented in the Report of Engineers on Deep Waterways.

Properly designed compensating works constructed immediately below the outlet of Lake Huron, would cause the lessening of the high slope and injurious currents could be avoided by means of a series of wing dams, so that there would be no objectionable velocity, and compensating works for Lake Erie and Huron could be constructed for approximately a million dollars.

Joseph Ripley, witness for the Sanitary District, whose qualifications have been heretofore stated (This Narrative p. 137) testified as follows (Vol. III, p. 1310):

The distinction between compensating and regulating works is that the former consist of fixed weirs and the latter is a combination of fixed weirs and movable dams. The effect of such works would be to increase the depth of the lake and make certain a continuance of such depth. A dam could be constructed in the St. Clair River about 1,300 feet up stream at Bunce Creek. Another dam could be located in the Detroit River in the Stony Island section. Also a dam placed in the Niagara River either near the upper end or down below Tonawanda would provide for the regulation of Lake Erie. These works would cost anywhere from $1,400,000 to $3,950,000, depending upon type of dam and the extent of the regulating feature; the St. Lawrence River from $200,000 to $1,000,000. The level of the lakes would thereby be raised from four inches to one foot.

The regulating works in the St. Clair River would lessen the current at Fort Gratiot which is the place of the swiftest current in the St. Clair River, and would thereby benefit navigation.

Gardner S. Williams, consulting engineer; Ann Arbor, Michigan, witness for the defendant, whose qualifications have been heretofore stated (Rec. Vol. II, p. 743; This Narrative p. 134) testified:

The backing up of the Upper Detroit River by the Livingstone Channel works and the raising of Lake Ontario by the Gut Dam in the St. Lawrence, illustrate the ease with which it is possible to compensate for diversions from Lake Michigan. It would be entirely feasible to close the Stony Island Channel and thereby reduce the discharge of the lower Detroit River by about 11,000 cubic seconds feet, which would raise Lake St. Clair in the neighborhood of two inches. The capacity of the Trenton Channel, which was found to be about 36,000 cubic feet seconds, could be easily reduced to an extent equal to the reduction of the Stony Island Channel or even more by a judicious filling in of material, and thus the compensation of Lake St. Clair obtained for the diversion at Chicago. The cost of this filling based upon the prices paid for moving the material in the vicinity of the mouth of the Detroit River, would be about $250,000. The total discharge of several channels at the mouth of the St. Clair is 194,000 cubic feet seconds. This total might be restricted to the extent of 15,000 cubic feet seconds without detrimental effects, and this would compensate for lowering Lake Michigan—Huron by the contemplated Chicago diversion. The cost of this compensation would be about $500,000, which makes a total of about $750,000 to compensate for the lowering of Lakes Michigan—Huron, the St. Clair and the St. Mary's, St. Clair and upper Detroit Rivers. The construction of the Gut Dam in the St. Lawrence has already compensated for the abstraction of water from Lake Ontario; and the International Waterways Commission are submitting a report

upon works to regulate the level of Lake Erie, which, if constructed, would provide for a compensation for the diversion from Lake Erie and the lower Detroit River.

The Rivers and Harbors Act of June 25, 1910, provided for the creation of a special Board of Engineers to make a report upon a waterway from Utica to the mouth of the Illinois River "and upon such measures as may be required to properly preserve the levels of the Great Lakes, and to compensate, so far as practicable, for the diminished level in said lakes and the connecting waters thereof by reason of any diversion of water from Lake Michigan for the maintenance of the proposed waterway herein described, or diversion for any other purpose."

The Special Board made its report August 15, 1913, to the Chief of Engineers, U. S. A. The board consisted of William H. Bixby, Brigadier General of the United States Army, retired president of the board, C. McD. Townsend, one of the witnesses for the plaintiff here, Colonel Corps of Engineers, United States Army, C. Keller, also a witness for the plaintiff, Major, Corps of Engineers, United States Army, J. B. Cavanaugh, Major, Corps of Engineers, United States Army, and John Bogert, civil engineer.

The above mentioned report before it was sent to Congress, thereafter known as House Document 762, Sixty-third Congress, Second Session, was reviewed by the Board of Engineers for Rivers & Harbors, and report made thereon. That report, including the report of the Special Board, so far as they are material, are as follows (Rec. Vol. IV, p. 2576-2590):

Report of the Board of Engineers for Rivers and Harbors.

[Second Indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

December 16, 1913.

To the Chief of Engineers, United States Army:

1. The Board of Engineers for Rivers and Harbors has had under consideration the final report of the special board of engineers.

* * *

I. FEASIBILITY OF THE WATERWAY.

2578 3. In the valley of the Desplaines and Upper Illinois Rivers, excellent foundations for locks are available; the lower Illinois has a gentle slope, so that any reasonable depth can be obtained by dredging, and the present diversion of water from Lake Michigan through the Chicago Drainage Canal is more than sufficient for navigation purposes. It is therefore the opinion of the special board that the waterway from Lockport to the mouth of the Illinois River is feasible.

II. THE MOST ADVISABLE DEPTH AND DIMENSIONS FOR THE WATERWAY.

4. In determining the most advisable depth for the waterway, the special board gives consideration to the character, origin, and destination of the probable commerce, and the type and dimensions of the vessels best suited to handle the traffic. It states that if the waterway is to be used by vessels capable of navigating the ocean and the Great Lakes, it should be given a depth suitable for the economic carrier now used on those bodies of water, which would fix the depth at not less than 24 feet; but if it is to be constructed for vessels adapted to river traffic, navigation does not require its depth to exceed 9 feet. A depth of 14 feet, which has been frequently urged for this waterway, is greater than necessary for river navigation and entirely insufficient for either lake or ocean vessels. A uniform depth on the Mississippi and its leading tributaries will be far more beneficial to the navigation interests of the United States than a main channel of great depth with shallow feeders. As a channel of 8 feet depth is now maintained from Cairo to St. Louis, and can be extended from St. Louis to Utica, on the Illinois river, at relatively small cost, business caution dictates that a waterway of this depth be obtained and tested before entering upon enormously expensive projects of questionable utility.

5. The special board considers a bottom width of 160 feet in canal and 200 feet in the open river above the mouth of the Illinois sufficient for a channel of 8 or 9 feet
2579 available depth. For safety and ease of navigation, the channel should be excavated to 11 feet in rock cuts and canals, and the locks should be given 11 feet depth, 80 feet width, and 600 feet usable length. A waterway of these dimensions would have a capacity exceeding 100,000,000 tons per annum.

III. CO-OPERATION WITH THE STATE OF ILLINOIS.

6. A project has been presented by the State of Illinois which contemplates the development of water power at four sites between Lockport and Utica, and the improvement of navigation by the construction of five large locks, 80 by 900 feet in horizontal dimensions, with 24 feet depth on their miter sills. This project proposes the utilization for power purposes of the water which may flow through the Chicago Drainage Canal and contemplates an ultimate channel depth of 24 feet for navigation purposes, though the estimates, amounting to approximately $20,000,000, provided for 24 feet only to Brandon Bridge and for 14 feet below. The special board states that the waterway proposed is more that sufficient for any probable navigation. It believes that the General Government will fully cooperate with the State in a waterway from Lockport to the mouth of the Illinois river if it assumes charge of the State structures at Henry and Copperas Creek, and enlarges the existing channel in the Illinois river below Utica to suitable dimensions.

IV. CONDITIONS NECESSARY IN CONNECTION WITH COOPERATION TO FULLY PROTECT THE INTERESTS OF THE UNITED STATES.

7. The special board states that a primary condition of any cooperation between the United States and the State of Illinois should be the acceptance in perpetuity of full responsibility by the State of Illinois or its agencies for all damages by changes in lake levels, including cost of compensating works, and for all damages to riparian owners, and the State should transfer to the United States the locks and the control of the new waterway thus created so far as needed by navigation, and the locks and dams at Henry and Copperas Creek on the Illinois river. With such a transfer the obligations of the State of Illinois to the United States with reference to the maintenance of the Illinois and Michigan Canal may be considered as adequately fulfilled, and any
2580 equities of the United States in the rights of ways and other properties of this canal should be transferred by the State of Illinois. The special board believes that should the State of Illinois be unable to complete the locks suggested by the board or the bridges required by navigation, the United States might then properly undertake to complete these parts of the project.

VI. SUCH MEASURES AS MAY BE REQUIRED TO PROPERLY PRESERVE THE LEVELS OF THE GREAT LAKES, ETC.

2581 9. The investigations and studies of this special board show that the diversion of water from the Lakes lowers the levels progressively in proportion to the amount so diverted, the full effect not being observable for some time; and that for the 10,000 second-feet diverted through the Chicago Drainage Canal, at mean lake level, the water surface will be lowered in Lakes Huron and Michigan 0.465 foot; in Lake Erie, 0.448 foot; in Lake Ontario, 0.431 foot. Such lowering would materially affect the carrying capacity of the large freight vessels, estimated at 88 tons per inch of draft, and would cause a loss on American vessels alone at the lowest estimate of $1,000,000 per annum.

10. Three methods for compensating for such diversion have been considered by the special board: (1) By the construction of submerged weirs with arbitrarily controllable sluices at the lower ends of the Lakes; (2) by reducing the area of the natural outlets by the construction of fixed contraction works therein; (3) by dredging harbors and connecting channels. The investigations of the board show with certainty that the result of diversion of water through a new outlet is a lowering of Lake level. The effect of the great storage capacity of the lakes and of the natural fluctuations of level due to natural causes, such as the varying amount of rainfall and the varying amount and direction of wind pressures, is such that the absolute level at a given time at any given place can not be predicted, and human wisdom is inadequate to regulate a variation of discharge through the outlet in such a manner as to produce a definite desired result. Method No. 1 therefore must be classed as impracticable. Compensation by dredging is practicable, but on account of the extensive areas involved, this method would be unduly costly. Of the three methods, the second only is therefore favorably considered. The special board proposes to hold up the level of Lake Erie by the construction of three submerged wiers in Niagara River, at an estimated cost of $150,000, and that of Lakes Michigan and Huron by submerged weirs in St. Clair River, at an estimated cost of $325,000, the total for compensating works being $475,000, with $15,000 annually for maintenance.

* * *

CONCLUSIONS.

2582 14. After due consideration of the reports of the special board the Board of Engineers for Rivers and Harbors concurs in general with the views and conclusions expressed therein. With the information now available, it is not prepared to indorse certain details of the discussions in the appendixes and elsewhere pertaining to the regulation of the level of Lake Superior,
2583 the regulation of the day and night discharge at Niagara Falls, and the estimates of cost for the dams across the Mississippi River. But inasmuch as this difference of opinion on these points does not affect the final conclusions, the board believes that nothing would be gained at this time by pursuing its investigation further. The board concurs fully with the general conclusions expressed by the special board in its final report, but differs slightly from those given in its preceding report. In this connection attention is invited to the following statements made by the Board of Engineers for Rivers and Harbors in its report of January 30, 1911, printed in House Document No. 1374, Sixty-first Congress, third session:

> It does not concur with the view of the special board that the United States should assume that part, if any, of the cost that is in excess of $20,000,000 for constructing the portion of the waterway between Lockport and Utica. Moreover, it suggests that the amount of diversion to be permitted from Lake Michigan should be determined, if practicable, before the project is undertaken.
>
> * * *
>
> It is understood that the sanitary district of Chicago and the State expect to develop considerable water power on that portion of the waterway between Chicago and Utica. As it is proposed that the navigable channel between these points shall be built without cost to the United States, it is believed that the General Government should relinquish to these local agencies any rights that it may have in the power to be thus developed. It does not appear that there is any question of water power, flood control, or other matter that can be coordinated with that portion of the work to be done by the United States for the improvement of navigation, so as to lessen the cost and compensate the Government for its expenditures made in the interest of navigation.

In conclusion it is recommended that the work proposed by the special board for the United States in the Illinois River be not undertaken until the Secretary of War has received satisfactory assurance from the State of Illinois that the State will build that portion of the waterway from Lockport to Utica without cost to the United States, and in accordance with plans to be approved by him; and, further, until the interests of the United States
2584 have been satisfactorily safeguarded as indicated by the special board, viz., that the State of Illinois, or its agencies, shall assume entire responsibility in perpetuity for all damages by changes in lake levels incident to the work, including cost of compensating works, and for all damages to riparian owners along the proposed waterway from Lake Michigan to the mouth of the Illinois River, and that the State shall transfer to the United States the locks and the control of the new waterway thus created so far as needed for navigation, and the locks and dams at Henry and Copperas Creek on the Illinois River.

15. It is the distinct recommendation of the Board of Engineers for Rivers and Harbors that the term "control of the new waterway thus created so far as needed for navigation" shall be interpreted to include such control of the use of water for power purposes as shall be necessary to insure the conditions of flow required for navigation. Further, the board believes that the total volume of water to be diverted from the natural discharge channels of the Lakes should be definitely fixed by Congress; that a project, with estimate of cost, for works necessary to compensate for such diversion should be prepared to the satisfaction of the Chief of Engineers and the Secretary of War; that before any diversion is made beyond that at present existing, the State of Illinois shall transfer to the Secretary of War the funds necessary for such works as given by the approved estimate of cost; that the works shall be built by the United States with the funds so provided; and that the control and maintenance of such works shall be in and at the cost of the United States.

16. As indicated above, the work proposed by the special board involves an original outlay by the United States of $1,050,000 for the Illinois River and $3,710,000 for the Mississippi River, or a total of $4,760,000, and provides for a navigable channel depth of 8 feet from Utica to St. Louis. The act ordering the investigation

appropriated $1,000,000 "for the construction of a waterway from Lockport, Ill., by way of the Des Plaines and Illinois Rivers to the mouth of said Illinois River," and provided that "until these plans and estimates have been submitted and a project adopted by Congress the appropriation of $1,000,000 herein made shall not be available for expenditure." If the project be adopted by Congress, this conditional appropriation should be
2585 made available for the improvement as a whole, and subsequent appropriations should be made with a view to completion of the work in four years. The Board of Engineers for Rivers and Harbors recommends the adoption of the project under the conditions stated above.

For the Board:

W. M. Black,
Colonel, Corps of Engineers,
Senior Member of the Board.

Final Report by a Special Board of Engineers on Waterway from Lockport, Ill., to Mouth of Illinois River.

New York City, August 15, 1913.

From: A Special Board of Engineers.

To: The Chief of Engineers, United States Army.

Subject: Report on waterway from Lockport, Ill., to the mouth of Illinois River, and on certain related subjects.

The Board of Engineers appointed by the Secretary of War September 8, 1910, in Special Orders, No. 43, Office of the Chief of Engineers, for the consideration of a waterway from Lockport, Ill., by way of the Des Plaines and Illinois Rivers, to the mouth of the said Illinois River, in its reports of November 1, 1910, and January 23, 1911, has discussed certain of the questions referred to it—namely: I, Feasibility of the waterway; II, the most advisable depths and dimensions for the waterway; III, cooperation with the State of Illinois; IV, conditions necessary in connection with cooperation to fully protect the interests of the United States, and V, plans and estimates of the cost of work recommended to be done by the United States. Since the submission of the above reports nothing has developed to require any changes in the statements and conclusions therein given. For convenience of reference these reports are attached hereto marked as Appendixes E and F.

The necessary additional investigations having been completed, the results of which are shown in Appendixes A, B, C, and D, the board now has the honor to submit the following report upon the remaining questions submitted to it for consideration:

> VI. Such measures as may be required to properly preserve the levels of the Great Lakes and to compensate, so far as practicable, for the diminished level in said Lakes and the connecting waters thereof by reason of any diversion of water from Lake Michigan for the maintenance of the proposed waterway * * * or for any other purpose.

2586 This subject is specially discussed in Appendix A.

Since 1895 the United States Lake Survey, under the direction of the Chief of Engineers, has made a systematic series of measurements of discharges in the St. Mary's, St. Clair, Detroit, Niagara, and St. Lawrence Rivers, to determine the relation which exists between the volumes of water discharged by these rivers and the levels of the lake surfaces. These discharge measurements have been numerous and demonstrate conclusively that there is a direct connection between the height of each lake and the volume of water discharged at its outlet.

For a change of 1 foot from the mean of the stages covered by the observations on each lake the discharge will vary as stated in Table I, and conversely the changes of level in feet, due to diversions from the natural outlets of varying amounts, will be as shown in Table II.

TABLE I.

Lake	Mean stage.*	Discharge at mean stage.	Change in discharge due to 1 foot change in level close to mean stage.
	Feet	Second-feet.	Second-feet.
Superior	601.80	75,000	15,300 gauge at S. W. canal pier.
Michigan-Huron ..	580.38	192,300	21,500 Fort Gratiot gauge. Lake St. Clair normal.
Erie	571.96	195,500	22,300 Buffalo L. H. gauge.
Ontario	244.60	230,000	23,200 Ogdensburg gauge. Discharge adjusted for effect of closure of Gut Channel in Galops Rapids, estimated to reduce existing discharges 9,000 cubic feet per second below those formerly existing at the same stages.

* Mean of range during discharge measurements.

TABLE II.—CHANGES OF LEVEL, IN FEET, DUE TO DIRECT DIVERSION OF AMOUNTS VARYING BETWEEN 1,000 AND 14,000 CUBIC FEET PER SECOND.

1,000 cubic feet	Superior	Michigan and Huron	Erie	Ontario
	Foot	Foot	Foot	Foot
1	0.065	0.046	0.045	0.043
2	.131	.093	.090	.086
3	.196	.139	.134	.129
4	.261	.186	.179	.172
5	.327	.232	.224	.2165
6	.392	.279	.269	.260
7	.457	.325	.314	.303
8	.523	.373	.359	.346
9	.588	.419	.404	.399
10	.654	.465	.448	.431
11	.719	.511	.493	.474
12	.784	.558	.538	.517
13	.850	.602	.583	.560
14	.915	.659	.628	.603

2587 These changes are obscured by variations in the supply of water from rains, by evaporation, by the effects of winds, and by the obstruction of the outlets by ice, and due to the reservoir capacity of the different lakes the action will not be immediate. As shown in the report of the Lake Survey for 1904, page 4120, one-half of the ultimate fall of Lakes Michigan and Huron will occur in 1.46 years, and nine-tenths of the fall will be completed in 4.86 years. For Lake Erie 50 per cent of the ultimate lowering will occur in 2.5 months and 90 per cent in 8 months; for Lake Ontario, in 2.1 months and 7 months, respectively.

It is therefore evident that when the Lakes stand at mean lake level a diversion of 10,000 cubic feet per second from Lake Michigan through the Chicago Drainage Canal will ultimately produce a lowering of the water surface of Lakes Michigan and Huron and its connecting harbors and channels of 0.465 feet (5.58 inches), of Lake Erie of 0.448 feet (5.38 inches), and of Lake Ontario of 0.431 feet (5.16 inches); at lower stages the effect will be greater, due to the relatively smaller area of the cross section of the outlets.

The largest lake freighters recently built carry over 80 short tons of freight for each inch of loaded draft, and an uncompensated Chicago diversion of 10,000 second-feet would cause a loss to each vessel of at least 446

tons in carrying capacity for each down trip through the channels connecting with Lakes Michigan and Huron. This, based upon 25 trips per season, with vessels returning light, means a loss of at least 11,150 tons per year, and at a freight rate of 55 cents per ton represents a monetary loss of at least $6,000 per large vessel per year. During the season of 1912 there passed through the locks at Sault Ste. Marie over 72,000,000 tons of freight, the greater part of which was carried in vessels of such size as to be affected by any loss of depth caused by a Chicago diversion. The tonnage of 1913 bids fair to exceed the tonnage of 1912. The lowest estimate of the loss to American vessels alone that has been brought to the attention of the board is over $1,000,000 per annum, and the loss will increase with the increase in the number and size of vessels.

It is evident therefore that any diversion with consequent lowering of lake levels will cause a direct financial loss to vessel owners and such a loss can be prevented only by the adoption of remedial measures. For this purpose three methods have been proposed. First,
2588 to regulate the level of the Lakes between fixed limits by the construction of submerged weirs and adjustable sluices at the lower ends of the Lakes, and by this means not only to prevent the oscillations of lake levels which occur daily each season, but also to equalize the flow over a series of years. Second, to compensate for the diminished discharge by reducing the area of the natural outlets by construction of contraction works therein. Third, to restore the original depths of the harbors and connecting channels by dredging.

It is the opinion of the board that while it is feasible to raise the average surface of the Lakes to any desired elevation by means of weirs and sluices it will be exceedingly difficult and in many ways impracticable to regulate the oscillations of the Lakes to a greater extent than nature now does automatically. These oscillations arise from winds, from the relative amount of rainfall and evaporation, and from other natural causes, which man can neither control nor forsee. The effect of any attempted regulation will be local rather than general, and the local benefits will be offset by injuries elsewhere. The difficulties in regulating lake levels are fully discussed by the International Waterways Commission in House Document No. 779, Sixty-first Congress, second session, and a resume of the views expressed therein is given in Appendix A.

To restore the diminished levels in the Lakes by constructing contracting works in their outlets does not however present any serious difficulties. A careful discussion of the proper locations and dimensions of such works is also given in Appendix A.

At the foot of Lake Ontario the closure of the Gut channel of the Galops Rapids by the Canadian Government has had the effect of raising the level of Lake Ontario an amount nearly equal to the computed lowering of the lake by a diversion of 10,000 second-feet at Chicago, and no compensation is at present deemed necessary to restore former conditions in this lake.

In Appendix A it is proposed to diminish the outflow of Lake Erie by the construction of three *submerged weirs in Niagara River* in the vicinity of Squaw Island, which would average about 4.2 feet in height and would contain about 15,000 cubic yards of masonry. The estimated cost is $150,000.

To raise the level of Lakes Michigan and Huron *submerged weirs* are proposed *in St. Clair River,* covering 3 miles of river below the mouth of Black River at Port
2589 Huron. The weirs as suggested in Appendix A have a height of from 5 to 6 feet above the river bed, contain about 65,000 cubic yards of material, and their estimated cost is $325,000. It is computed that these weirs will increase the velocity of the water flowing over them slightly (from a mean of 3.28 feet to 3.89 feet per second), but, on the other hand, above the mouth of Black River the river slopes and velocities which are now excessive will be diminished, and navigation on the whole will be considerably benefited.

The Chicago diversion has no effect on Lake Superior.

Compensation for the loss of elevation on Lakes Michigan, Huron, and Erie, and their connecting waters, due to an assumed diversion from Lake Michigan of 10,000 second-feet, will by the plan above outlined involve an expenditure of about $475,000, to which should be added an amount for the maintenance of the weirs, estimated at about $15,000 per year, the total cost being much less than the cost of restoration of depths by dredging. It is the opinion of the board that while other plans have been proposed, compensation by fixed contraction works similar in general to those above described affords the cheapest and most satisfactory method of preserving the levels of the Great Lakes.

No estimates have been considered for compensating for the loss of depths in the St. Lawrence River, as such work is regarded as outside the scope of the duties of the board.

THE SANITARY DISTRICT DIVERSION WORKS COST AND THEIR OPERATION, EFFECTIVENESS, RESULTS, SEWER AND WATER SUPPLY SYSTEM OF CHICAGO AND COST.

George M. Wisner, a witness for the defendant (Rec., Vol. III, p. 1592-1703), January 20, 1914:

Resides at Chicago; civil engineer; graduate U. of Michigan, Academic Department, and also Degree of Civil Engineer, 1892; then Chief Engineer of the Sanitary District of Chicago; been Chief Engineer since 1907; started with Sanitary District in 1892 as a rod-man; then sub-instrument man; then sub-assistant engineer; then assistant engineer; then chief assistant engineer; chief engineer in 1907. As chief engineer, in charge of engineering department; designed all works carried on by the District and constructed and in process of construction; original research by experimental stations, particularly sewage disposal and water purification; duties for Sanitary District in beginning involved studying sewage disposal, sewage conditions, hydraulic problems; in connection with sewage disposal, visited plants at Columbus, Baltimore, Milwaukee, Washington and other American cities, Birmingham, Manchester, London, England; Paris, France and Berlin, Germany.

The witness further testified as follows:

1594 Familiar with all the works of the Sanitary District the sewerage and water supply system of Chicago.

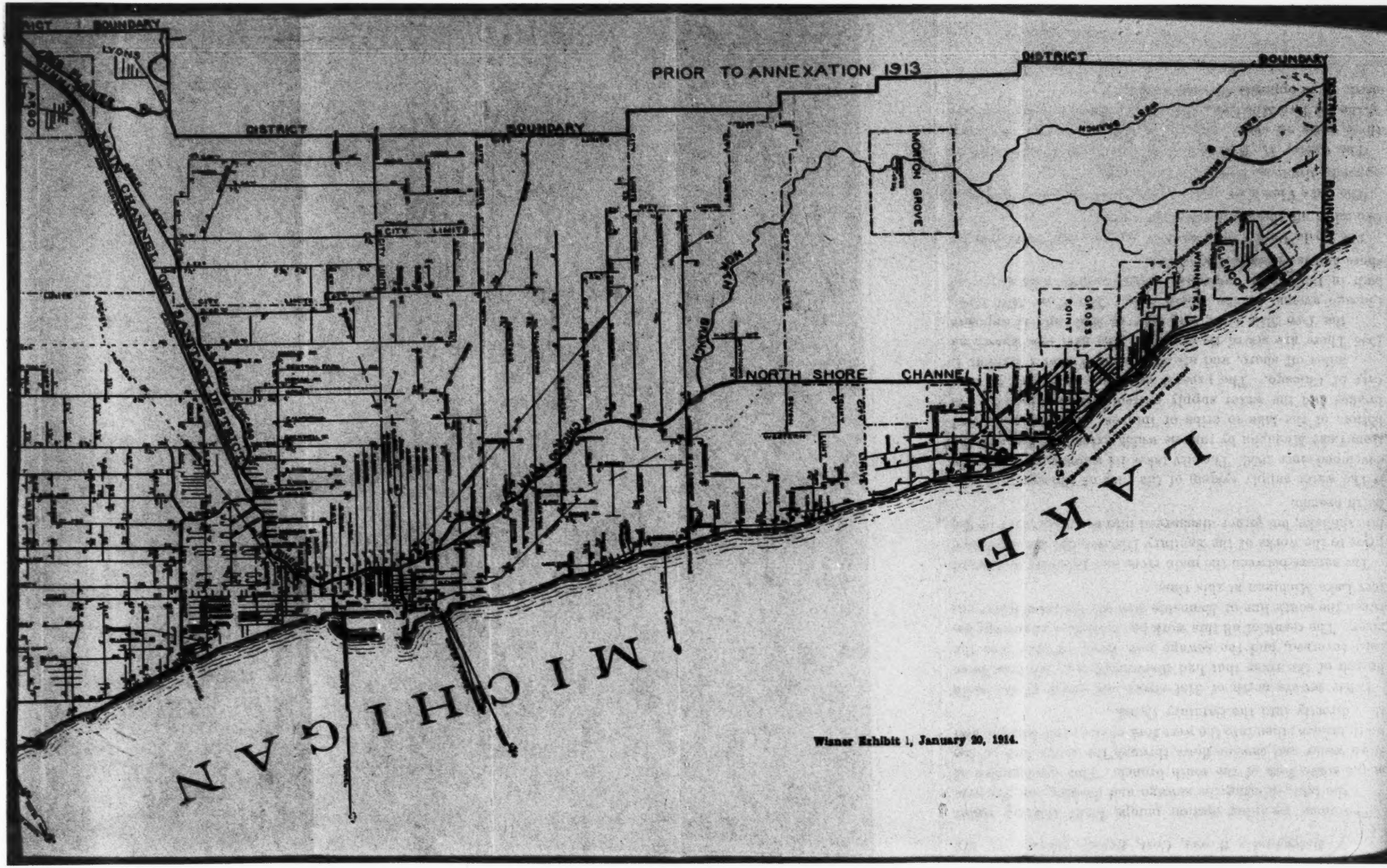
The sewerage system of the City of Chicago consists of sewers built for the collection of sewage; the first one being built in 1855, and they have been added to since, piece by

piece. They range in size from six inch tile up to brick sewers 20 feet in diameter. The more important sewers are those that are two feet in size and over, as shown on Wisner Exhibit 1 on page opposite.

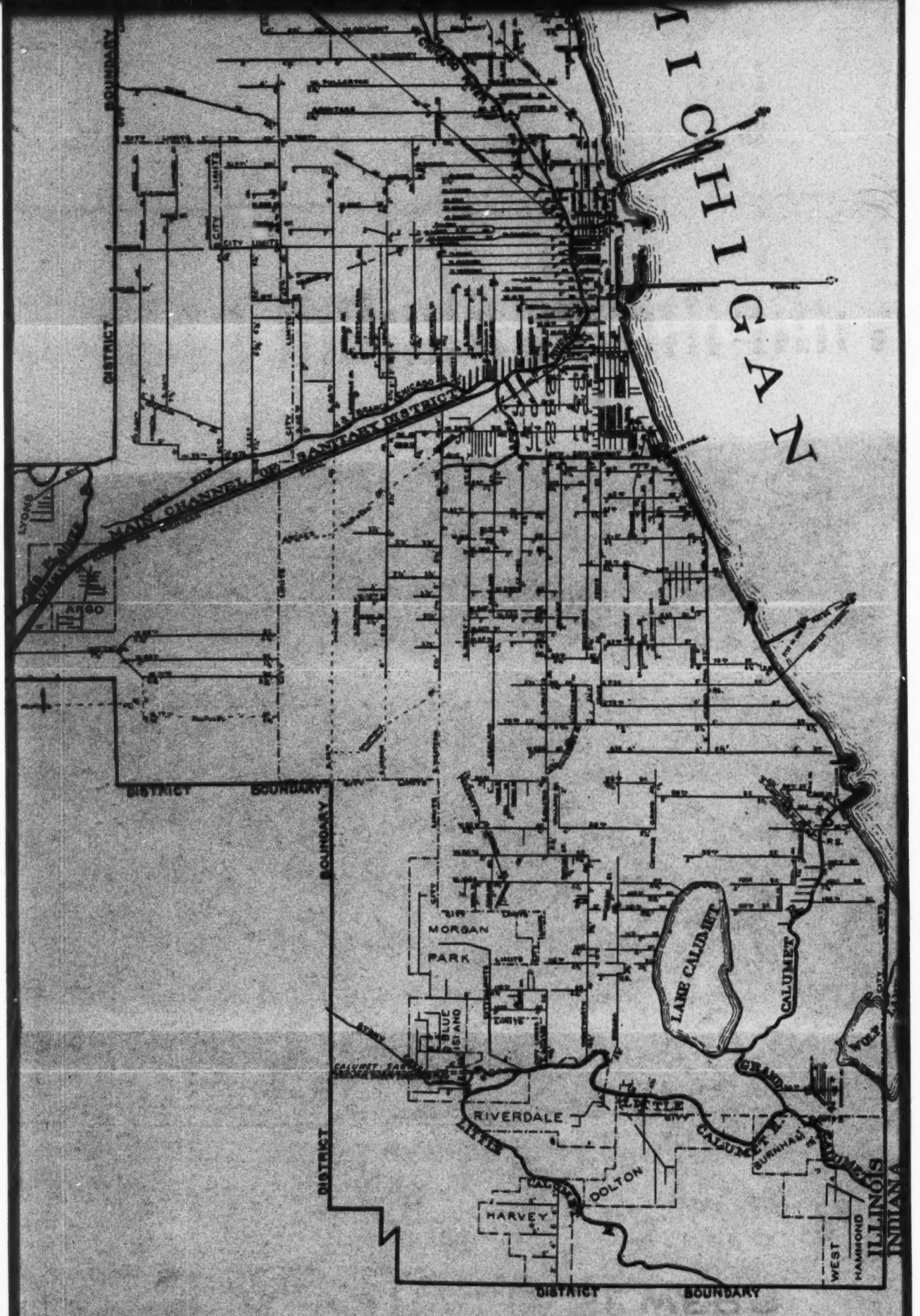
The sewers originally discharged into the Chicago River, and a part of them, on the north and south sides, directly into Lake Michigan. The sewers are all built on what is known as the combined system; that is they receive both the storm water and the sanitary sewage; all the sewage coming directly from the homes and buildings of the city. They also receive to a large extent the manufacturing wastes.

There have been completed recently two main intercepting sewer systems. These were built by the City of Chicago to prevent the sewers that had previously discharged directly into the Lake from discharging into it; in other words to keep the sewage out of the lake. One is on the North Side, and is shown on Wisner Exhibit 1, appearing on page opposite, starting on the north of Howard avenue and running south to Lawrence avenue, and a part of the same system starting on the south at Diversey boulevard and running north to Lawrence avenue, where the sewage is picked up by pumps and forced through a conduit 16 feet in diameter on Lawrence avenue to the west and into the north branch at that street. This pumping station also pumps diluting water
1595 from Lake Michigan, mixing it with the sewage water, and being utilized for dilution of the sewage and flushing the North Branch.

The other intercepting sewer system is on the South Side, as shown on Wisner Exhibit 1, and extends on the south from 87th street north to 39th street and the lake, and from 31st street south to 39th street, preventing the sewage which had flowed directly into the lake from flowing therein. At 39th street it is picked up by pumps and forced through a 20-foot conduit west to Halsted street, where it discharges into the east arm of the south fork of the south branch of the Chicago River. This is the arm of the river that is commonly known as Bubbly Creek. (Wisner Exhibit 1, inserted on page opposite.)



Wisner Exhibit 1, January 20, 1914.



SANITARY DISTRICT OF CHICAGO

MAP OF THE

CITY OF CHICAGO AND VICINITY

SHOWING

MAIN OUTFALL SEWERS.

CHICAGO JANUARY, 1914.

SCALE IN STATUTE MILES

The same pumping station pumps fresh diluting water from the lake, diluting the sewage and flushing out the arm of the south fork of the south branch. This combination of fresh water and sewage flows through the south fork to the south branch; then into the west fork of the south branch, and thence directly into the Sanitary Canal.

Other sewers north of 31st street and south of the main branch of the river that had discharged into the lake have been reversed, and the sewage now flows directly into the river. The result of all this work has been that no sewage between the south line of Evanston and the Calumet River enters Lake Michigan at this time.

The sewers between the main river and Diversey boulevard prior to the works of the Sanitary District, did not discharge into the lake, but either discharged into the main river or the north branch.

The water supply system of the City of Chicago has been developed since 1852. The city takes its water supply directly from Lake Michigan by tunnels which extend out beneath the bottom of the lake to cribs or intakes. These tunnels and intakes and the water supply system is maintained by the City of Chicago. The present cribs are from two to four miles off shore, and are shown on Wisner's Exhibit 1.
1596 There are six of these cribs. The first one, known as the Two Mile Crib, was built in 1867, and is opposite Chicago avenue on the North Side. The Four Mile Crib, built in 1892, is, as indicated, approximately four miles off shore and is opposite 14th street.

The Hyde Park Crib was built in 1894, and is practically two miles off shore opposite 68th street.

The Lake View Crib built in 1896, is two miles off shore and opposite Montrose avenue, or boulevard.

The Carter H. Harrison Crib was built in 1899, and is three miles off shore; practically amounts to the extending of the old Two Mile Crib, although I believe at times both are used. It is opposite Chicago avenue.

The Dunne Crib built in 1910, is two miles off shore and opposite 68th street. It is right alongside of what is known as the Hyde Park Crib. It was put in to give additional capacity for this particular part of Chicago that those two cribs serve.

This water, after passing through these tunnels under the lake is then carried by land tunnels to pumping stations located in different parts of the city, and forced through the mains to consumers.

The Sanitary District was organized in 1889, and the construction was started in 1892. The principal feature of its work has been the construction of what is known as the Main Channel. This channel begins at Robey street and the Chicago River, which is about 6 1/3 miles from the mouth of the river. It was originally 28.05 miles long and extended from Robey street the starting point to Lockport, Illinois. Practically the first 14 miles of it was through clay and glacial deposits, and the lower 14 miles was through limestone rock.

The Chicago end of the canal, for about 7 miles, was constructed to about half of the ultimate capacity. It was capable of progressive development as the needs for additional water became necessary to dilute the sewage. This extended to a place known as Summit.

1597 From Summit to Willow Springs, a distance of another 7 miles, the channel was constructed to its full capacity; and from Willow Springs to Lockport, through the rock, it was constructed to its full capacity.

The channel at the upper end was 110 feet wide on the bottom, and had side slopes of one vertical on two horizontals.

The second stretch through the glacial deposit to Willow Springs was 202 feet wide on the bottom, and with the same side slopes. From Willow Springs to Lockport, generally, the channel was 160 feet wide on the bottom, and 162 feet wide on the top, with sides that were practically vertical.

At the end of the channel were controlling works for regulating the amount of water flowed through the Chicago River and the Main Channel.

In 1903, the right was obtained from the Legislature to develop power which had been incidentally created in connection with this work, and the channel was extended to practically the City of Joliet. Prior to this, however, the Sanitary District had done considerable work improving the Des Plaines River below the end of the Main Channel and through the City of Joliet, removing several dams nd deepening the stream, building levees and walls. This power development involved the lengthening of the upper reach of the Main Channel for about two miles, at which point was located a power house, dams for regulating the flow and a lock for the passage of vessels from one level to the lower level. It developed an average head of about 34 feet, and the plant is capable of developing about 4,000 kilowatts for every 100,000 cubic feet of water flowed per minute; generally, in round numbers, that is true.

Below the power house, the channel is carried on the same depth, practically the same depth as above the power house, which I neglected to give, it being about 24 feet at normal stages of the lake, to a point near to the upper limits of Joliet, where it is from there through the City of Joliet ten feet or over in depth. This power extension was completed in the latter part of 1907.

This work involved the construction of transmission lines and distributing systems in the City of Chicago, most of the power being brought to Chicago for the lighting
1598 of streets and pumping of water for the municipality, the excess being sold for commercial purposes. This power was all developed incidental to the sewage disposal, and the District has never flowed more water on account of power developments than it would have flowed if there had been no development there. Prior to this construction this power was simply going to waste, and it simply amounted to the conservation of this wasted energy.

In connection with getting water through the Main Channel, it became necessary, on account of the restrictions placed

on the velocity of the current in the South Branch for the Sanitary District to improve the South Branch of the Chicago River by widening and deepening it and by the removal of certain bridges, whose center piers interfered with the free passage of the water through the river.

The Sanitary District has expended approximately $11,500,000, on the improvement of the Chicago River. This money was expended almost entirely under what is known as the 1900 Project. It generally was expended to widen the South Branch from its junction with the North Branch at Lake street to the beginning of the Drainage Canal at Robey street. The river has been widened to a width of at least 200 feet, and it has been deepened so that at the dock lines there is a depth of water of 16 feet, gradually deepening to a point 50 feet out from the docks where it is 26 feet deep for the middle 100 feet of the river. This depth of water is below what was known as the hydraulic grade of the river; that is the water in flowing from the Lake to the Drainage Canal has a slope which at times is two feet lower at Robey street than the Lake level.

This widening of the Chicago River involved the purchase of over 792,000 square feet of property along the Chicago River, and generally, I should say, the river had been widened on an average 50 feet. The widest piece taken off was 110 feet in width, and from that down to nothing.

This involved the excavation of over 5,500,000 cubic yards of material; the construction of over 19,000 lineal feet of dock, for wherever the Sanitary District widened the river it became necessary to build new docks.

In the improvement of the river, as already stated, the Sanitary District replaced many of the old center pier bridges with bridges of the modern type, known as bascule 1599 bridges. It has replaced or rebuilt the following bridges across the Chicago River: State street, Dearborn street, Randolph street (and is now engaged upon the construction of a new bridge at Jackson boulevard), Harrison street (Polk

street was built by the City of Chicago), Taylor street, Chicago Terminal Transfer Railroad Bridge, now owned and operated by the Baltimore & Ohio Railroad (it has agreed to pay half the cost of rebuilding the 12th street bridge, which has been ordered out by the Secretary of War), 18th street, Canal street, 22nd street, Main street, Throop street and Ashland avenue. One other bridge was removed and reconstructed by the City of Chicago. That is at Washington street.

Widening the river also involved the removal of many buildings, and paying damages to adjacent property owners.

The Sanitary District has also widened and deepened the North Branch of the Chicago River from Belmont avenue to Lawrence avenue, a distance of about two miles. This stream, prior to this straightening and deepening, was practically dry in the summer time, simply being a small creek. The Sanitary District made a stream having a depth of 12 feet and a width of 90; and has also deepened the South Fork of the South Branch to a depth of 20 feet; has done considerable work in the West Fork of the South Branch west of the beginning of the Main Channel, deepening it about three feet.

This, generally, covers the work done by the Sanitary District as far as its main channel and the Chicago River are concerned, with the possible exception of the North Shore Channel which was completed in the latter part of 1910 and early in 1911; and it extends from Wilmette and the Lake to the North Branch of the Chicago River at Lawrence avenue. This was a rather small canal, having about 13 feet of water. It is navigable and was built to take care of the sewage coming from what is known as the North Shore towns, that is the towns from Glencoe south to the Chicago Limit, including Evanston, Wilmette, Winnetka, Kenilworth and Glencoe. It is provided with a pumping plant at Wilmette, which pumps 1,000 cubic feet of water per second through this canal and down into the North Branch, and the water to be used for diluting the sewage and flushing out the North Branch, which otherwise would be stagnant, septic, and become a local nui-

sance. This water flows then directly into the South Branch and into the Drainage Canal.

The South Branch had been dredged by the United States Government to a depth of 17 feet, but it had shoaled up
1600 considerably, due to silt coming in from the lake and sediment coming from sewers, so that at the time the District started on the deepening of the South Branch, it did not have available probably over 16 feet.

At Joliet, the terminus of the Sanitary District Channel there was space left, and the work was so designed that a large lock could be installed when the deep waterway is constructed.

The Chicago River through the main river is 20 feet; through the South Branch and West Fork down to the main channel 26 feet. The main channel itself at ordinary stages is at least 24 feet as far as the power plant. Below the power plant it is 20 feet to the north limits of Joliet, and from there on at least 10 feet in depth down to Dam Number 1, which is near the center or heart of the city of Joliet. Below there the Des Plaines River is not navigable. The only means of navigation from there on at the present time to the Illinois River is by way of the old Illinois and Michigan Canal.

The United States has expended in the improvement of the harbor at the mouth of the Chicago River approximately $2,390,000. No part of that sum was expended in the improvement of the Chicago River. The Government did not expend any money in connection with the improvement of the Chicago River until 1896.

Since 1896 the United States expended, up to say June 30, 1913, in the improvement of the Chicago River itself approximately $1,626,000.

It was expended for dredging the North and the South Branches to a depth of 17 feet on the first project, and later the deepening of the North Branch as far north as Belmont avenue, I think, to a depth of 20 feet.

The Government also bought some land on both branches of the river for the purpose of constructing what is
1601 known as turning basins. These are basins that are large enough so that vessels can turn around and come back down the river bow first. The one on the North Branch is at Diversey boulevard, and the one on the South Branch is at the junction of the West Fork and the South Branch, just east of Ashland avenue. Part of this money on the original project was expended for widening the Chicago River at some of the narrowest and most dangerous places. Part of this money was expended deepening the main branch of the river to a depth of 20 feet from the mouth to the junction of the two branches. Generally this covers the money that was expended by the Government for the improvement of the river.

The City of Chicago has expended in the improvement of the Chicago River approximately $6,275,000.

From about 1861 to the present time, approximately to this time it was expended for dredging of the Chicago River, both the main river and on all its branches, building of bridges and docks, and general improvements.

These improvements in the Chicago River were done by the United States Government during the time that the Sanitary District was completing its works—particularly the South Branch. The deepening of the North Branch has been done in quite recent years; that is deepening the North Branch to 20 feet.

Since the 17 foot project of the United States Government it has done no work on the South Branch, although it has deepened the North Branch to 20 feet. The Sanitary District took up its work and did this dredging. When the Sanitary District started on this project, the Government had not quite completed the dredging to 17 feet. It was widening the river at certain places where it was narrow, that is the South Branch. Some of this work of the Government and the Sanitary District was carried on simultaneously. The widening

done by the Government however was at a few places, and did not amount to very much.

The Sanitary District commenced its work on the improvement of the Chicago River along about 1896.

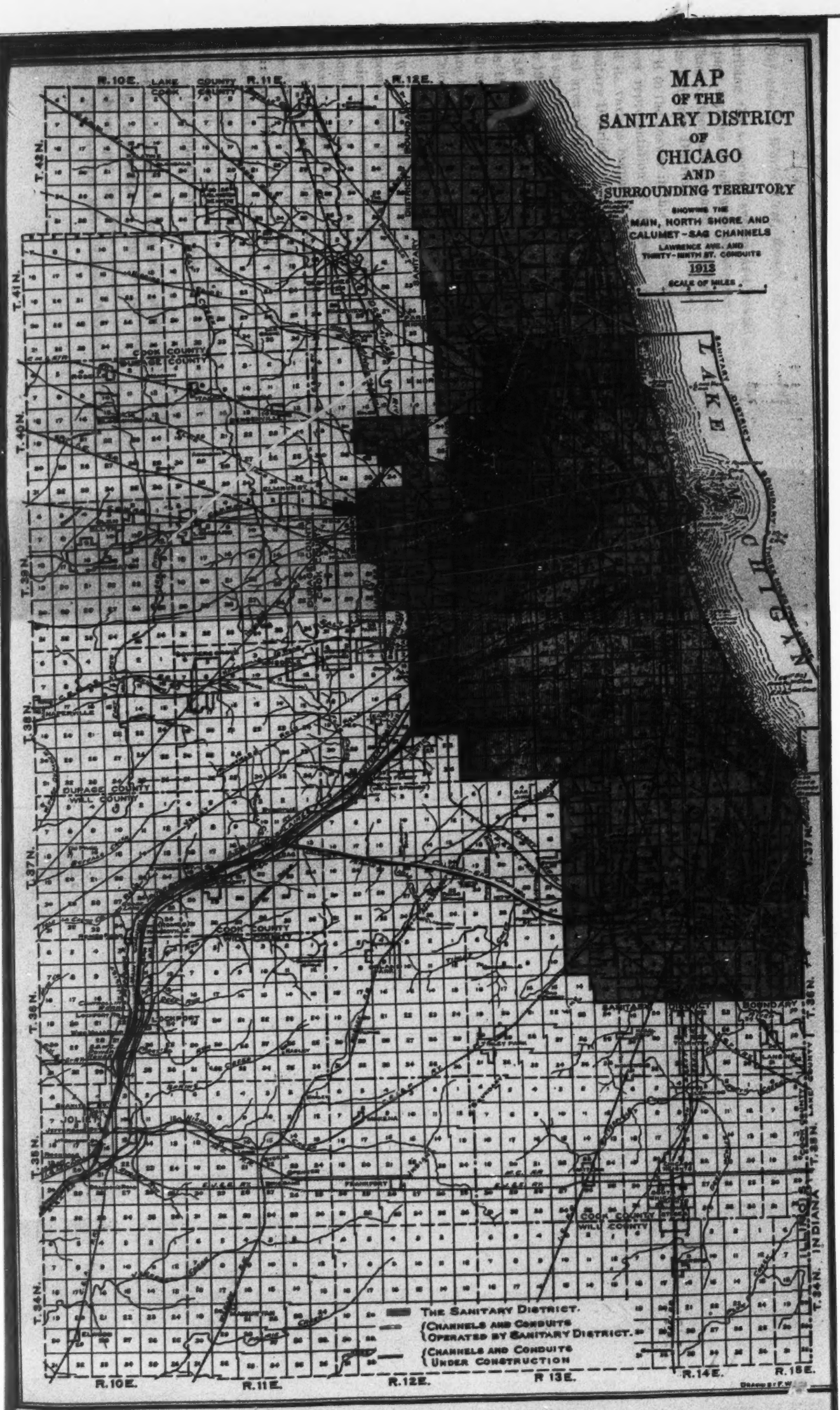
1602 Prior to the time the Sanitary District widened and deepened it, boats drawing over 16 feet of water could not have navigated the South Branch, even providing that the tunnels had been removed, for the reason that there was not any more available depth than that. Up to the time that the Sanitary District started its dredging a boat over 400 feet in length could not have navigated beyond 22nd street, for the reason that between 22nd and Halsted street the river was very narrow and tortuous, and a boat of that length could not make the turn. Boats having a beam greater than 48 feet would probably not have been able to pass through some of the bridge openings. These bridges have since been removed and replaced by modern bridges giving a wider opening.

As the result of the Sanitary District improvements in the Chicago River at this time a boat of probably 500 feet could navigate the river, and drawing 20 feet; the depth being controlled by the depth of the main branch of the river. If certain bridges, which are now either coming out or shortly to come out are removed, a boat of larger length could be taken down the river.

In the South Branch the critical point probably, the critical stretch, is from Lake street to the turning basin at Ashland avenue. This will safely take, in my opinion, 8,000 cubic feet a second. From there on to the Drainage Canal, the river is much wider, and with the same depth would take an additional flow of water without any injury to navigation.

The current would not exceed 1¼ miles an hour through that stretch anywhere.

The Sanitary District has done some work in improvement on the Illinois River, and some improvement in a sanitary way for some of the smaller towns within the limits of the Sanitary District.



ORIGINAL SANITARY DISTRICT SHOWN IN GREEN.

In describing the sewerage system and speaking of the pumping stations which were constructed by the City
1603 of Chicago, they are assumed to be a part of the works of the Sanitary District.

Exhibit B to the answer in this case (this narrative p. 79) is a correct representation of the position of the Chicago River and its various branches with reference to the limits of the Sanitary District.

The total area of the Sanitary District is at the present time 386.2 square miles. The original Sanitary District, that was up to 1903, was 185 square miles. The North Shore District of 78.6 miles was added at that time, as was what was known as the Calumet District amounting to 94.5 square miles, and under a recent act of the Legislature 28.1 square miles more have been added to it. This includes all of the City of Chicago, the area of which is a little over 191 square miles.

Map (Wisner's Exhibit 2, January 20, 1914, inserted on page opposite) was prepared under my direction. It is a map showing the land sections of Cook County, part of Du Page County, a part of Will County; and generally shows and was made to show the areas comprising the Sanitary District with its relation to the Chicago River and the main Drainage Canal. The part of the map which is tinted green is the original Sanitary District. The part lying to the north of this and tinted a brown is the area that was added to the Sanitary District by the Legislature in 1903; and the part lying to the south of the green tint and tinted brown is what is known as the Calumet Extension to the District, and was added in 1903.

The part tinted brown and lying west of the green tint is that which has been added to the District recently. The yellow tint shown upon this map indicates the branches of the Chicago River and the Main Drainage Channel extending to Joliet.

1604 The part tinted red, or red line, and marked Calumet-Sag Channel is the Calumet-Sag Channel which is now being constructed from the Little Calumet River, east of Blue Island to the present main drainage channel at the place marked Sag.

The Fullerton avenue conduit was built by the City of Chicago prior to the Sanitary District work, and is a conduit extending from Lake Michigan to Fullerton avenue and the North Branch; was installed for the purpose of flushing the North Branch.

The Calumet Sag Channel is a channel extending from the Little Calumet River just east of Blue Island to the Main Drainage Channel at the Sag, a distance of approximately 18 miles. It is a channel which is to have water 20 feet in depth, and through the rock sections is 60 feet in width, and through the earth sections generally 36 feet in width on the bottom, with side slopes varying from one vertical to two horizontal, to flatter slopes.

It is to have regulating and controlling works located at its eastern end, which will control the amount of water that can flow through it. Generally it is designed to carry 2,000 cubic feet per second at this time, but it is capable of progressive development so that it can ultimately be enlarged to carry at least 4,000 cubic feet per second. It was not done at this time for the reason that it figured cheaper to make this progressive development than to make a large initial investment, which would not be needed for some years to come.

At the present time, this work is under construction, there being nine contract sections awarded by contract averaging about a mile and a quarter long; there are about five more to be let within the next few months.

This canal will be navigable.

Cities, villages and towns located within the limits of the Sanitary District are Chicago, Evanston, Glencoe, Winnetka, Wilmette, Shermerville, Glen View, Morton Grove, Niles, Cicero, Stickney, Evergreen Park, Morgan Park, Blue

1605 Island, Riverdale, Oak Park, Berwyn, Forest Park, River Forest, Maywood, Riverside, Brookfield, Bellwood, Franklin Park, Melrose Park, River Grove, Dolton, Harvey, West Hammond, Worth, Bremen, Calumet, Kenilworth, Burnham.

The drainage area of the Chicago River basin is about 307 square miles. The run-off of the Chicago River basin in a dry season is practically the city water supply, and some little ground water, but at times of maximum floods it will reach as high as 10,000 cubic feet per second.

The inhabitants of the Sanitary District within the boundary of the Sanitary District have generally no available water supply other than Lake Michigan.

It would be impossible to supply the entire inhabitants of the Sanitary District with a good supply of water by any other means. There are a few wells in Chicago and the smaller places, which are used for that purpose; but it would be impossible to get sufficient water from a ground supply to supply the entire city.

Prior to the opening of the Drainage Channel to illustrate what the appearance of the Chicago River was, it is only necessary to say that practically the entire North and South branches were in the same condition as that part of the Chicago River known as Bubbly Creek is at the present time. It was a filthy, dirty sewage polluted water, in a septic condition, with gas bubbles rising; having large cakes of floating sewage mud. This mud was held at the surface by the gas being generated in it. A large percentage of the docks along the river were falling into the stream. The river was littered up with old worn out bridge protections which interfered with the passage of boats, and in fact often proved a menace to the boats, for the reason that the piles were rotted off below the surface of the water. Not only the appearance of the river was objectionable to the eye but the odors coming from it were objectionable to the nostrils; and at times of flood could be smelled for long distances. It was a disgrace to a civilized community at that time.

At times it flowed in different directions. The current was practically stagnant except in times of floods due
1606 to heavy rains, and the run-off of melting snows. Although the Bridgeport Pumping Works were operating, pumping between 40,000 and 50,000 cubic feet of water per minute out of the South Branch, this was so insufficient that it did not make any perceptible current; and often the current could be observed running towards the lake, due to the sudden drop of the lake level.

When the lake would rise, one might observe a current of water coming in from the lake, but generally the river was stagnant.

In times of heavy rains, this sewage polluted water was driven by the storm run-off into the lake, polluting the water supply. This was traced to several miles from shore, and went even beyond the present location of the Four Mile Crib.

On account of the lake rising and falling as stated above, large quantities of this sewage polluted water found its way into the lake and resulted in not only the river itself being objectionable to the eye and nose, but the lake at the mouth of the river was objectionable. It contained large quantities of sewage pollution for a considerable distance from the mouth of the river.

The opening of the Drainage Channel absolutely remedied this condition, so that at the present time there is no local nuisance in the Chicago River and the sewage does not get into the lake polluting the water supply at any place between the Calumet River and the south line of Evanston.

Up to December 31, 1912, $61,845,838 had been expended by the Sanitary District of Chicago and the City of Chicago for the construction of works now in operation. The works of the Sanitary District of Chicago include the Main Channel, North Shore Channel, and the various appurtenances necessitated, including bridges, the enlargement of the Chicago River, the diversion of the Des Plaines River, and the construction of flushing pumps. Those paid for by the City

1607 of Chicago include the intercepting sewers on the North and South Sides, the Lawrence avenue sewage pumping station, and also the sewage pumping station at Fullerton avenue and 39th street. The Sanitary District, as stated before, paid part of the construction of the 39th street station.

The 39th street pumping station and conduit, in taking water away from Lake Michigan has a capacity of 2,000 cubic feet per second, or 120,000 cubic feet per minute.

The Lawrence avenue pumping station has a capacity of 40,000 cubic feet per minute.

It is the intention to flow 8,000 cubic feet per second through the main river and the south branch to its junction with the South Fork of the South Branch, at which place will come an additional 2,000 feet from the 39th street pumping station, and from this junction of these two branches to the Main Channel, a flow of 10,000 cubic feet.

As stated before, this stretch of the river is wider than the river is east and north of Ashland avenue, and is fully capable of taking the 10,000 feet without creating a velocity of probably over a mile an hour.

The cost of the works built and paid for by the Sanitary District of Chicago and the City of Chicago, for the purposes of sanitation, with a rated capacity of 10,000 cubic feet per second through the Main Channel, and having a velocity in the Chicago River not to exceed a mile and a quarter per hour is $64,095,000.

This cost is made up of the amount expended by the Sanitary District on completed works, which has already been mentioned, and the expenditure by the City of Chicago for works already described, and for the work which has been practically finished during the last year, which is the widening of the eastern end of the present Main Channel, which have been spoken of before as being capable of progressive development; and also includes an estimate of the cost of completing the Chicago River widening to 200 feet. There yet remains four places where it is not quite com-

pleted; and certain other minor details, which go to bring this figure up to the amount stated.

1608 These costs have been taken from the books of the District and the City of Chicago. An allowance has been made for the actual interest on the bonds prior to the opening of the Main Channel in 1900, an estimated amount for interest during construction for works built by the District after 1900, and a proportion of the overhead charges of the District pro rated in accordance with the construction and maintenance expenditures. An allowance has also been made for the interest during construction on the city expenditures.

The following table gives in some detail the money that has been expended for different purposes and projects.

COST OF WORKS OF THE SANITARY DISTRICT OF CHICAGO AND THE CITY OF CHICAGO.

The Sanitary District of Chicago— To December 31, 1912.	
Right of Way,	$9,703,018.37
Construction of Main Channel and Controlling Works,	19,813,197.96
Bridges (Incl. Chicago R., North Branch and North Shore)	6,633,073.23
North Shore Channel and Wilmette P. Sta.	1,450,985.83
Rivers (Chicago River, River Diversion, and North Branch)	3,666,720.23
Flushing and sewers,	782,150.20
Joliet (Joliet Project, incl. bridges)	1,601,104.30
Administration, Engineering, Legal and Clerical Expenses (Excluding water power eng., and Calumet Sag and prorated M. & O. charge)	6,658,923.05

Miscellaneous (Illinois and Michigan Canal)	167,404.88	
Bond interest and Premium Acct. to Dec. 31, 1899, actual,	2,950,618.42	
Interest computed on construction carried on from Jan. 1, 1900, to Dec. 31, 1912, allowing equivalent one year at 4¼ per cent	737,697.42	
1609 Damages, Lands, Marine, personal	276,782.11	$54,441,676.00
Contract Work in 1913 and 1914.		
Estimated Overhead Expense	900,000.00	
Estimated Cost of Dredging	1,486,085.00	
Interest during construction 1 year at 4¼%	63,158.61	$ 2,249,243.61
	(Exhibit Cont.)	
	For	$56,690,919.61
The City of Chicago—		
Intercepting Sewers, Land, etc.	$5,312,024.74	
Fullerton Ave. Pumping Station	115,308.75	
Lawrence Ave. Pumping Station	452,635.65	
39th Street Pumping Station	944,143.98	
Estimated Interest during Construction — half period on four year basis	580,049.62	$ 7,404,162.74
		$64,095,082.35

The annual cost of the works for a diversion of 10,000 cubic feet per second is $508,832.09, including maintenance and operation, overhead charges and depreciation; and an allowance has been made for the receipts from rental.

This brings the total cost of a 10,000 cubic feet diversion project up to $76,067,582. This sum includes the annual cost

capitalized at 4¼ per cent and the original construction investment. The details are as follows:

M. & O. acct. 8,000 c. f. p. s.	$	210,036.99
1610 Estimated overhead		50,032.33
Depreciation:		
Main Channel, etc., as of 8,000 c. f. p. s.		265,030.68
Addit. investment ½ of 1% on $2,249,243.61		11,246.22
City Acct.		
½ of 1% on 6,414,440.88		32,072.20
5% on 409,672.24		20,483.61
	$	588,902.03
Less rentals		80,069.94
Annual		508,832.09
Capitalized at 4¼%		11,972,500.00
Investment		64,095,082.00
Corrected figures		$76,067,582.00

To December 31, 1913, about $2,080,000 has been expended on the Calumet-Sag Channel. This includes the construction of the channel, purchase of right of way, engineering, legal and real estate expenses; but no allowance for overhead or interest upon the money invested. The additional liability incurred on account of contracts that have been awarded is about $3,300,000. This brings the total amount of the liabilities up to about $5,380,000.

The estimated cost of the completed project is $14,290,000. This is made up of the items as given in the following table. This includes the construction of the channel for a capacity of 2,000 cubic feet per second, with controlling works, intercepting sewers to bring the sewage to the channel from the principal centers and for the sterilization of certain storm overflows, land, engineering and contingencies.

1611 CALUMET SAG CHANNEL

2000 C. F. P. S.

Canal Proper, incl. Eng. & Con.		$ 8,140,435.00
Contingencies 10%		814,043.00
Interest during Constr.—		
Allow for three years at 4¼% on	$8,954,478.00	1,141,695.00
Old Accounts—		
Main Channel Extension	458,082.50	
Bridges	179.08	
Engineering Expense	32,969.69	491,231.27
Interest on $491,231.27 1 year at 4¼%		20,877.33
		$10,608,282.53
Intercepting Sewer (1930) at 900 gals. P. Cap.	$1,468,045.00	
Pumping Stations (Bldgs. 1930 Eq. 1920	617,025.00	
Disinfection Plants	489,054.00	
Sewers account West Hammond, Harvey and Hegewisch	177,214.00	
Land	100,850.00	
	$2,852,188.00	
Eng. & Conting. 15%	427,828.00	
	$3,280,016.00	
Inter. during Constr.—		
Allow 3 years at 4¼%	401,802.00	3,681,818.00
Total cost		$14,290,100.53
Capitalized operating cost of Channel, etc		1,424,500.00
Capitalized operating cost sewers, etc., as of 1920		3,734,870.00
Total, Capitalized and Construction		$19,449,470.00

The capitalized operating cost of the channel is $1,424,500, and of the sewers that are to be constructed in connection with it $3,734,870, bringing the total capitalized cost and construction cost up to $19,450,000 in round numbers.

1612 The construction cost of the Calumet-Sag Project for a diversion of 4,000 cubic feet per second is estimated to bring the total construction cost of this channel when enlarged to 4,000 cubic feet per second up to $19,925,000. The capitalized operating cost would be, $6,229,000. The total capitalized cost and construction cost will be $25,729,000, in round numbers. The following is an estimate in detail, giving these figures:

CALUMET-SAG CHANNEL.

4000 C. F. P. S.

Cost of 2000 C. F. P. S. project,		$14,290,100.00
Additional to widen channel,		5,000,000.00
Interest during Constr., say 2 years at 4¼% ($200,000) (12,500)		425,000.00
Additional to bring equipment Pump Sta., etc., up to 1930.		
Pumping Sta.	$ 75,000.00	
Miscellaneous sewers, etc.	135,000.00	210,000.00
Total Construction Cost,		19,925,100.00
Capitalized Operating Cost (as of 1930)		
Total for sewer,		4,216,800.00
Total for channel,		2,012,740.00
Total Capitalized and Construction cost,		$25,729,640.00

The capacity of the Main Channel from the terminus of the Calumet-Sag Channel to the controlling works is 14,000 cubic feet per second.

The following is a table giving the costs for the different 1613 flows:

Flow Cu. Ft. Per Sec.	Investment of Construction cost	Annual Cost Operating Plus Depreciation	Capitalized Gross Cost
10,000	$64,095,082.00	$508,832.00	$76,067,600.00
+2,000	+14,290,100.00	+219,273.00	+19,449,470.00
12,000	78,385,182.00	728,105.00	95,517,070.00
+2,000	+5,635,000.00	+58,133.00	+7,002,840.00
14,000	84,020,182.00	786,238.00	102,519,910.00

The cost of the electrical development of the Sanitary District to December 31, 1912, was $5,349,241.57. This comprises the book account valuation of the electrical development of $5,047,625.57, plus an allowance made to have this cost comparable with the other costs for the purpose of our analysis, the allowance covering interest during construction, taken at 4¼% on the cost during construction for ½ the period during which these works were being built.

The following table gives the investment cost on the construction, the annual cost of operation and the gross capitalized and construction cost and the capitalized electrical credit; and this is subtracted in the last column from the gross capitalized cost. The allowance for the income coming from the electrical department is based on the value in the Chicago market for electric energy used for commercial purposes; and is based on what could be developed over that which could be developed with a flow of 4,167 cubic feet per second.

The present electrical plant and equipment is sufficient to generate the energy coming from the flow of 14,000 cubic feet per second, with the possible exception that one electrical water wheel unit would have to be installed, provision for which has been made.

1614 NET CAPITALIZED COST DILUTION SCHEME.

Flow Cu. Ft. per Sec.	Investment or Construction	Annual Cost Operating Plus Depreciation	Capitalized Gross Cost	Electrical Credit Capitalized	Net Capitalized
10,000	$64,095,082.00	$508,852.00	$76,067,600.00	$13,242,000	$62,825,600
12,000	78,385,182.00	728,105.00	95,517,070.00	17,790,000	77,720,970
14,000	84,020,182.00	786,238.00	102,519,910.00	22,306,000	80,213,900

Since the sewerage system was started to be installed in 1855, the City of Chicago has expended, up to December 31, 1912, $31,867,268.68. This is exclusive of any intercepting sewers. The sewer systems in the outlying villages and towns up to an average period of 1911, had cost $5,246,764.16.

The water supply system of the City of Chicago up to December 31, 1912, had cost $49,948,318.06. The water supply system of the outlying villages and towns within the Sanitary District, so far as the same can be obtained, has cost about $2,000,000 for five towns out of seventeen outside of Chicago, but inside the Sanitary District. No allowance is made for interest during construction in these figures. Adding the expenditures of the Sanitary District as given above, brings the total amount expended for water supply and sewage disposal up to the total sum of $150,908,189.64. If all charges could be obtained and the methods of work known, this figure would be materially increased.

The purpose of the works of the Sanitary District of Chicago is to provide for the proper and efficient sewage disposal, and to protect the water supply from pollution; and in so doing to so dilute the sewage that local nuisances will be prevented within the corporate limits of the Sanitary District; and to dilute this sewage with a minimum flow of 3⅓ cubic feet per second for every 1,000 people sewering into the channels of the District, so that nuisances will
1615 be prevented in the Des Plaines and Illinois Rivers below the end of the works of the Sanitary District.

For the disposal of the domestic sewage, 3⅓ cubic feet per second per thousand people draining into the channel is sufficient.

The effect of the flow through the Main Channel is to dilute the sewage coming from the Sanitary District to such an extent that it avoids all local nuisances in the Main Channel itself, and in the Des Plaines and Illinois Rivers. It flushes out the Chicago River, and the Des Plaines River from Joliet to the Illinois River is thoroughly flushed under summer conditions; whereas, formerly there was practically no flow in the Des Plaines River north of the junction of the Kankakee and the Des Plaines. This continued for many months in the year.

In the Illinois River, the effect has been to produce a constant flow, and it has improved the conditions of the water of the Illinois River all the way to the Mississippi River, over what it was under summer conditions.

The effect has also been to improve the navigation in the Des Plaines and the Illinois Rivers, by increasing the dry weather flow and giving greater depths. This also, as stated, has improved the sanitary conditions, by affording increased dilution for the cities and towns sewering into the river below Chicago.

The value of the water powers on the Illinois River has also been increased, by increasing the flow.

The value of the fish and mussel industry in the Illinois River has materially increased since the opening of the
1616 Main Channel. In my opinion this improvement is almost wholly due to the maintenance of a cleaner condition of the river, and the additional food furnished by the products of the self-purification of the stream for supporting fish life.

The fishing industry has gradually increased in value. The figures given in the special report of the United States census for 1908, on the Fisheries of the United States show that the fisheries in the Illinois River have grown as follows:

Year	Tons	Value
1894	3,000	$162,000
1899	7,000	382,000
1908	23,000	860,000

Besides the growth of the fishing industry, there has been a great increase in the mussel industry. The mussel shells are used for making buttons. This is shown by the following table, taken from the special report of the United States census, 1908:

Year	Tons	Value
1894	24	$ 700
1899	2,500	43,000
1908	20,000	184,000

And in that time there was also $170,000 worth of pearls taken from these mussels. From the investigations of the Sanitary District, it appears probable that the amount of fish now caught exceeds the figure given by the census of 1908.

The conditions in the Chicago River prior to the opening of the canal have been described. The Illinois River was a slow, sluggish stream in the summer time, having a very small discharge, and in times of run-off of melting snows and heavy rains, the discharge was quite voluminous. The condition of the river was that it was a polluted stream, particularly below Peoria where the sewage from Peoria and the wastes coming from the distilleries polluted the water to such an extent that it was practically a nuisance. From a navigation standpoint there was some little navigation maintained by dams, which produced slack water, and it was generally navigable from Utica to the Mississippi.

1617 Since 1909 regular examinations, both chemical and bacteriological of the waters of the Illinois River, showing the effects of the Drainage Canal upon the Des Plaines and the

Illinois Rivers have been made, and it shows that the waters are in good shape from the standpoint of the oxygen content below Marseilles. This has been carried on continuously for the last several years.

The same investigations have been made in the Main Channel, in regard to the condition of the combined sewage and fresh water, by having the water analyzed regularly. Up to the present time pretty nearly all of the manufacturing wastes from the city have been going into the sewage and channel without any preliminary treatment. There has been some slight treatment by means of removing part of the settling solids from certain industries. The result has been that there has been large accumulations of deposits in certain parts of the channel, where at times in the hot weather local nuisance is present; but the condition is now so much better than it was prior to the opening of the canal, which parallels the old Illinois and Michigan Canal, which prior to 1900 ran its capacity full of septic sewage, water and mud, so that the improvement down the Des Plaines Valley has been considerable, but at the same time there has not been sufficient water to take care of and properly oxidize both the domestic sewage and the manufacturing wastes, coming from the large industries in this city. There are large deposits of sewage mud in the Main Channel from the end of the narrow earth section that I have spoken of to Willow Springs where the rock section starts. There is practically no sludge deposits in the rock section until Lockport is reached, where the Main Channel was widened out for the purpose of making a basin at the controlling works, and in the stretch of the new channel built for the development of water power. In these stretches of the channel, there have been big deposits which in the summer time produce gas and are in a fair way to make a local nuisance. In the vicinity of the controlling works, odors are at times perceptible. This is where the deposits occur principally.

1618 The flow in the Main Channel in the last few years has been practically what is called for by the law, but prior

to that it was not up to what was called for by the State law, for the reason that the Chicago River had not been improved and the District was restrained by the Secretary of War from causing a current in the South Branch of the River to exceed a mile and a quarter an hour. For that reason, the flow in the early years of the canal was not what it should have been or what was called for by the state law; that is 20,000 cubic feet per minute for every 100,000 people draining into the channel.

The following tabulation shows the population within the limits from year to year between 1900 and 1913, and the average daily flow in cubic feet per second based on the population as provided by the state law.

Year	Population Based on U. S. Census		Average Daily Flow in Cu. Ft. per Second Population Basis	
	Within Limits S. D. C.	Actually Tributary M. C.	Total	Actual
Original Limits				
1900	1,638,656	1,294,312	5462	4314
1901	1,690,874	1,331,119	5636	4437
1902	1,740,129	1,364,961	5800	4569
1903	1,789,593	1,399,014	5965	4663
Territory Annexed				
1903	1,933,694	1,543,115	6445	5144
1904	1,987,205	1,581,376	6624	5271
1905	2,040,717	1,614,228	6802	5381
1906	2,094,228	1,887,605	6981	6292
1907	2,147,740	1,933,176	7159	6444
1908	2,201,250	1,978,744	7337	6596
1909	2,254,763	2,091,015	7516	6970
1910	2,308,276	2,139,787	7694	7132
1911	2,361,788	2,188,524	7872	7295
1912	2,415,300	2,237,330	8051	7458
1913	2,468,811	2,285,993	8229	7619
Territory Annexed				
1913	2,498,660	2,285,993	8329	7619

1619 In the early part of 1908, the water power plant was installed, and the only way of measuring the water that went through the canal was to use the water wheels as a meter. These wheels had been tested in a flume at Holyoke, by which in an approximate way we could get at their discharge under different gate openings.

Recently it has appeared that these discharges are somewhat small. This is based upon measurements made and some that have been submitted by the United States Government.

The amounts shown to have been discharged through the Main Channel of the Sanitary District in the last column, includes lake water, sewage and storm water and everything that passes through the end of the canal at Lockport.

The hygienic improvement in the Chicago water supply due to the opening and operation of the Main Channel and its appurtenances was very marked after all the sewage had been diverted from the lake. The intercepting sewers were not wholly completed until 1910, but were practically completed on the south side in 1906 and on the north side in 1908. Since that time, the reduction has been more marked in the typhoid fever death rate, so that today the water supply from the criterion of typhoid fever death rate compares very favorably with other large cities in the United States and in Europe. The typhoid fever death rate is lower than in many cities having filtered water supplies. In 1912, Chicago's typhoid fever death rate was 7.5 per hundred thousand. From 1909 to 1912, the typhoid fever death rate in Chicago was lower than that of Pittsburgh, Philadelphia,
Washington and New Orleans, all of which have filtered
1620 water supplies. The rate was also lower in Chicago than
in other cities having filters; namely, Albany, Atlanta, Birmingham, Columbus, Grand Rapids, Indianapolis, Louisville, New Haven, Oakland, Providence, Scranton and Toledo.

The following table shows the total population located in Chicago, the north shore towns and the Calumet district, which drains its sewage into the lake:

After the opening of the Main Channel, January 17, 1900.

POPULATION DISCHARGING INTO LAKE MICHIGAN INSIDE PRESENT SHORE LINES OF THE SANITARY DISTRICT.

Year	Total	Between 87th Street and South Boundary of Evanston
1900	344,344	223,625
1904	405,829	265,940
1905	426,489	281,708‡
1906	206,623	57,100
1907	214,564	60,300
1908	222,506	63,500†
1909	163,748	0
1910	168,489	0
1912	177,970	0

‡39th Street pumping station district diverted in 1905.

†Lawrence Avenue pumping station district diverted in 1908.

And this lesser number from year to year, as indicated upon this table, of population discharging into the lake and within the present shore lines is due to the fact that intercepting sewers were opened from time to time, and the sewage of the population discharged into the Main Channel where it is tributary to the Sanitary District.

The third column of the table shows the population between 87th street in Chicago on the south and Evanston on the north, that has drained into the lake since the opening of the channel.

The second column shows the total including Evanston and the Calumet District.

1621 And prior to 1900, all of the sewage substantially was drained into the lake, with the exception of what was pumped through the old Illinois and Michigan Canal.

The effect of the sewage from the towns in Lake County, Illinois, is practically nil on the water supply of Chicago. These towns include Highland Park, Lake Forest and Waukegan. There are no currents in Lake Michigan, other than

varying drifts produced by the wind. The sewage discharge in Lake County nearest the Lake View crib is over 16 miles away. The population is small, so that the protection to Chicago by dilution probably suffices for many years to come. The danger is to the water supply of the villages themselves more than to the City of Chicago proper.

The effect of the sewage from the towns in Lake County, Indiana, on the water supply of Chicago, as taken from the 68th Street or the Dunne Crib is largely influenced by the condition of the Calumet River, into which these towns discharge a part of their sewage. Flood discharges will heavily pollute the water of the lake around the crib. In drier weather, pollution may occur with sudden rains. The pollution has been traced eight to ten miles into the lake.

The district is taking steps now to reverse the Calumet River and to keep the sewage coming from the Sanitary District out of it, so that in times of flood the water in the river will not be polluted with sewage. It is also negotiating with the Indiana towns to get them to remove or purify their sewage before it enters the lake or the Calumet River, to such an extent that it will be non-putrescible.

The typhoid fever death rate shows that the quality of the Chicago water supply is excellent from a hygienic standpoint, and is far purer than most of the larger municipal supplies in the United States.

1622 The 68th Street and Dunne cribs on the south, and the Lake View crib on the north are, however, exposed to possible pollution and on the north on account of Evanston not having diverted its sewage as yet. The effect on the Chicago water of outside pollution from the north of the Cook County line is very remote. Pollution from the Calumet region in Indiana is very intermittent, but may be severe in its effect on the 68th Street and Dunne cribs.

The effect of pollution coming from passenger vessels and other vessels is being minimized by the action of the city in keeping the vessels away from the intakes, and to have the

closets locked, or tanks to store the sewage in while the vessels are passing in and out of the harbor. The shipping factor is particularly of moment in the summer months. This chiefly affects the cribs at the mouth of the Chicago River.

In the recent storms, this fall, the water supply of the city has been extremely turbid at times and in consequence the newspapers have quoted the Health Department as advising the boiling of the water. The condition of the water and the attitude of the Health Department was investigated by the Engineering Department. The records of the analysis made by the Health Department laboratory shows practically no difference in the hygienic quality of the water on account of the storms. The turbidity or aesthetic appearance of the water was, however, unsatisfactory. The Health Commissioner, Doctor Young, and his laboratory director, Doctor Tonney, both admitted advising the boiling of the water in an informal way to the newspaper men, but stated that this was a precautionary measure only, inasmuch as it is impossible to learn the quality of the water by immediate tests. The bacteriological tests employed do not give results until after 48 hours have elapsed. Their opinion was the same as ours, that only the appearance of the water had been injured by recent storms, and that the hygienic quality of the water was unimpaired, rendering boiling unnecessary.

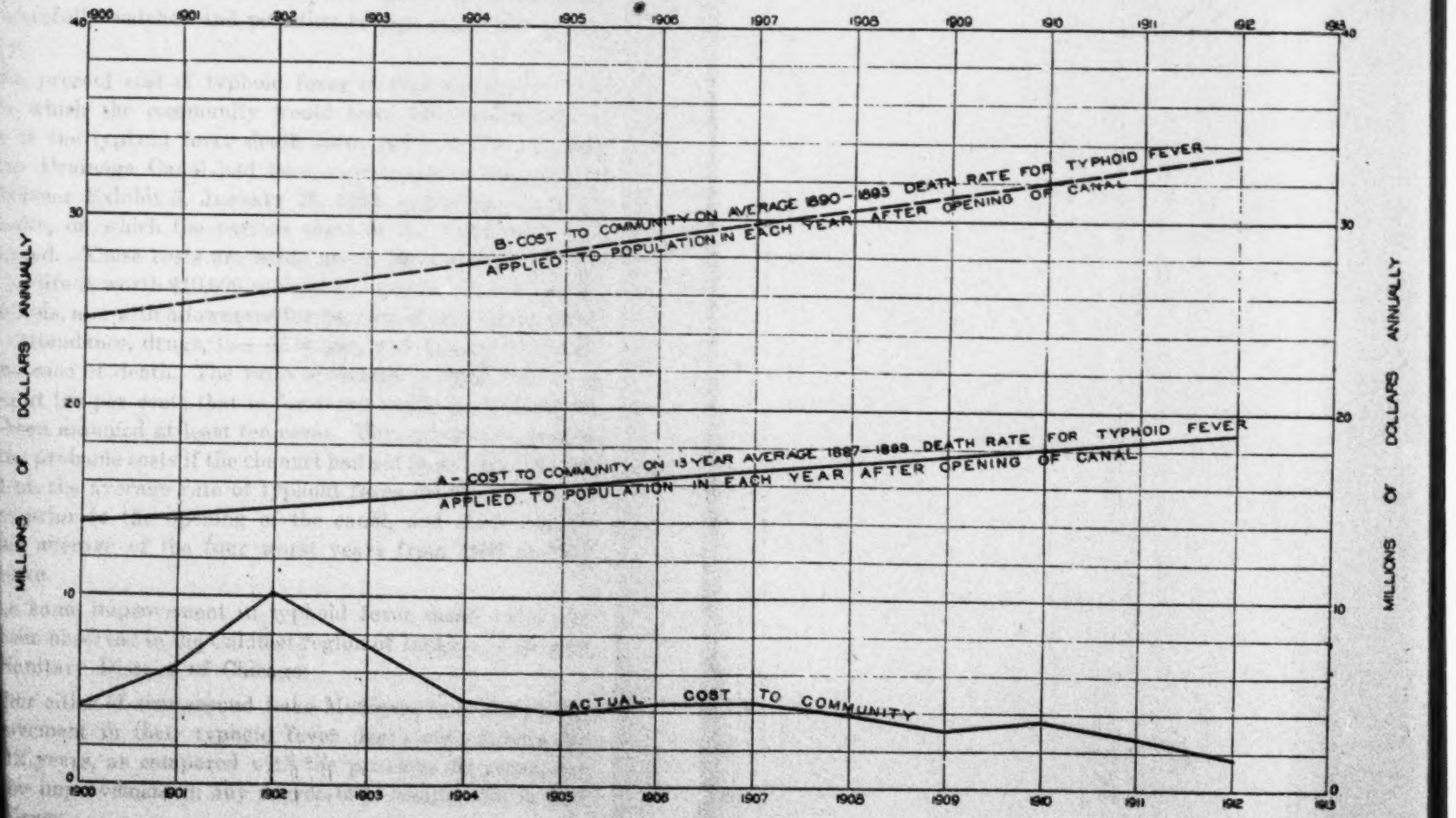
1623 For 13 years prior to the opening of the Drainage Canal, the average typhoid fever death rate was 52.6 per one hundred thousand. For the 13 years after the opening of the canal, the death rate was 19.9 per one hundred thousand. This reduction is about 68 per cent, and would have been more marked had the sewage been intercepted completely earlier in the last 13 years.

The average death rate for the diarrhoeal diseases for the period before the opening of the Drainage Canal was 418.2 per one hundred thousand. This was reduced to 187.2, a reduction of 55 per cent.

Wisner Exhibit 3, January 20, 1914.

THE SANITARY DISTRICT OF CHICAGO

CHART SHOWING SAVING TO COMMUNITY BY REDUCTION OF TYPHOID FEVER SINCE OPENING OF DRAINAGE CANAL JANUARY 2. 1900.



The typhoid fever death rate in Chicago has been reduced markedly, even compared with the reductions affected in cities where filtration plants have been installed. The rates for 1911 and 1912 were lower than the rates in the cities of Philadelphia, Washington, Pittsburgh, and New Orleans, where filtered water is supplied. They are as low as in Boston and lower than San Francisco where the water sheds are carefully watched and pollution is kept out of the reservoirs.

The present cost of typhoid fever to this community, the costs which the community would have been called on to bear if the typhoid fever death rates prior to the opening of the Drainage Canal had been maintained is best shown by Wisner Exhibit 3, January 20, 1914, appearing on page opposite, on which the various costs to the community are indicated. These costs are made up on the assumption that a life is worth $10,000 as fixed by certain statutes in Illi-
1624 nois, and with allowances for the cost of nursing, medical attendance, drugs, loss of wages, and funeral expenses in the case of death. The ratio of deaths to cases has been taken at ten per cent; that is for every death reported there has been assumed at least ten cases. Two curves are plotted for the probable costs if the channel had not been built, one figured on the average rate of typhoid fever deaths for the 13 years prior to the opening of the canal, and other figured on the average of the four worst years from 1890 to 1893 inclusive.

The same improvement in typhoid fever death rates has not been observed in the Calumet region of Indiana, adjoining the Sanitary District of Chicago.

Other cities of size around Lake Michigan have not shown improvement in their typhoid fever death rate during the last 12 years, as compared with the previous 20 years, nor has the improvement in any degree been comparable to that in Chicago.

In Milwaukee, for instance, the typhoid situation has been practically unchanged for over 30 years, the rate at times

being practically as high as 30 years ago. The improvement in Chicago has been very favorable. In Michigan City, a city of 19,000 people in 1910, the typhoid rate has been high, with violent fluctuations, extending over a range of from nothing to 112 deaths per one hundred thousand between 1882 and 1907.

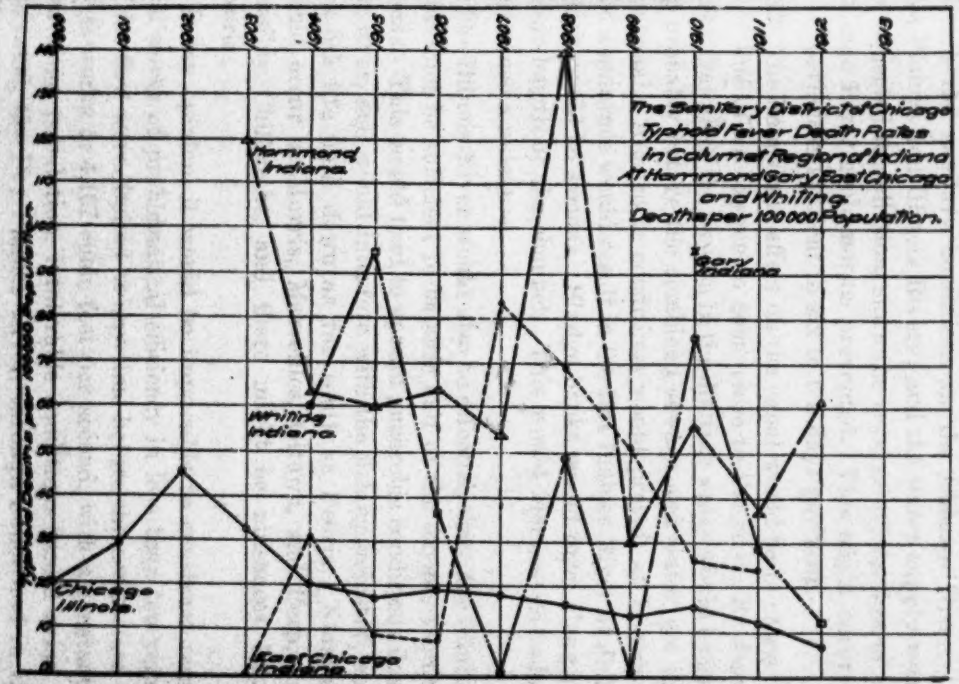
The same improvement in typhoid fever death rates in the towns in Indiana, adjoining Illinois, has not been ob-
1625 served. The current typhoid fever death rates are shown on Wisner Exhibit 4, January 20, 1914, appearing on page opposite.

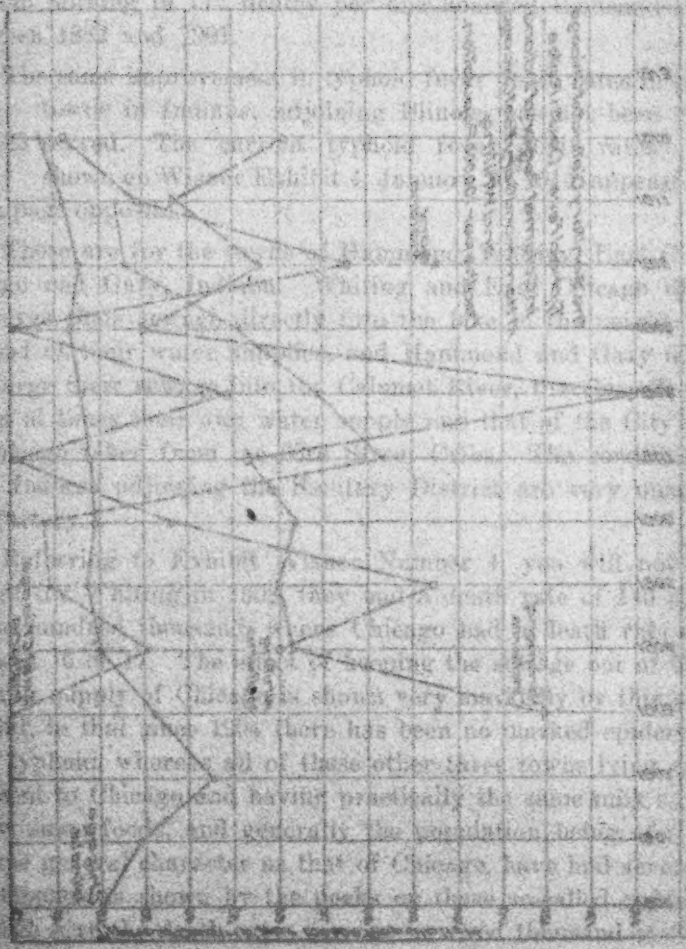
These are for the towns of Hammond, Whiting, East Chicago and Gary, Indiana. Whiting and East Chicago discharge their sewage directly into the lake in the neighborhood of their water supplies, and Hammond and Gary discharge their sewage into the Calumet River, thereby affecting at times their own water supply and that of the City of Chicago taken from the 68th Street Cribs. The conditions in Indiana adjoining the Sanitary District are very unsatisfactory.

Referring to Exhibit Wisner Number 4, you will notice that for Whiting in 1908, they had a death rate of 140 per one hundred thousand, where Chicago had a death rate of about 16 or 17. The effect of keeping the sewage out of the water supply of Chicago is shown very markedly by this exhibit, in that since 1904 there has been no marked epidemic of typhoid, whereas all of these other three towns lying adjacent to Chicago and having practically the same milk supply, same foods, and generally the population being of the same general character as that of Chicago, have had several epidemics as shown by the peaks on these so-called curves, which give the death rates per one hundred thousand of the people living in these towns.

Since 1902, Chicago has had nothing that represents an epidemic, and the line from 1904, the solid line on this exhibit, which represents the death rate from typhoid fever in

Wisner Exhibit 4.





Chicago, has been gradually going down, showing a decrease in the typhoid fever death rate.

The effect of a diversion of only 4,167 cubic feet per second would injure the quality of the water supply and seriously disturb the sanitary conditions in the Chicago River, the Des Plaines and Illinois Rivers; and the water supply would be subjected to pollution, since the reversal of the flow of the Chicago River could not be prevented. This might occur on periods equivalent to six to ten days per year.

1626 The immediate effect on the canal would be to cause the line of no oxygen to come close to the city. By that I mean that all of the oxygen in the diluting water would be used up probably before the combined sewage and water got into the canal. Anaerobic conditions would prevail at Lockport, and a nuisance would result in the Des Plaines River at Joliet which would be serious. Sludge banks would form along the whole length of the channel. This would increase the odors and cause a nuisance.

The Illinois River would also be affected, since the dilution would not be sufficient to balance half of the oxygen requirements. This would tend to spread anaerobic conditions down the river, and would interfere with the fishing industry, ending fish life until down as far south as Peoria. Nuisance would occur at Morris, Marseilles, Ottawa, and Peru, and possibly Chillicothe, and there might be nuisances below Peoria.

In my opinion, it would be impossible to construct remedial works of problematical efficiency in less than ten years. If the flow were limited at any time before the completion of these works to 4,167 cubic feet per second, with a constantly increasing population, intolerable conditions would arise in the canal, the Des Plaines River, through Joliet and in the Illinois. Conditions in large portions of the Chicago River proper would be a living nuisance. Sludge would accumulate in the Chicago River.

In times of high water when the river was reversed as just mentioned, this accumulation of sludge would probably be scoured into the lake, polluting the water supply with the sewage polluted water of the river itself.

Assuming that the flow were reduced at once to 4,167 cubic feet per second, there is no thoroughly satisfactory emergency treatment. If the flow were continued in accordance with the minimum ratio of 3 1/3 cubic feet per second, a double expense would be thrust upon the Sanitary District, as it would have to develop the canal to a capacity of 12,000 cubic feet per second before the other works could be put into service.
1627 The only suggestion would be the use of an excessive amount of chloride of lime. This would be unsatisfactory, as the sludge would still go into the river and create nuisance, and in addition would be very costly. Time would be required to install emergency works on such a large scale.

The daily floating population by 1920 in Chicago will be 300,000 people. There is today a transient population of 68,000,000 in the course of a year, including through and local travellers from outside the boundaries of the district, who may be assumed to come in contact with conditions in the City of Chicago.

The records obtainable from the different railroads coming into Chicago were obtained and these figures compiled from figures given to us; and also from steamship companies.

The people were counted coming into the stations for a certain length of time to get an estimate of the number of people where the railroad companies had no sufficient data at hand.

The probable population of the Sanitary District in the years 1920, 1930 and 1940 is based on the United States census reports, and upon the probable growth of the city in the future as based upon what it and other large communities have done in the past.

The amounts of water required for the population based upon the minimum legal flow for dilution and compilation with reference to future population are as follows:

Year	Population	Flow required in Cu. Ft. per. second
1910 Actual	2,308,276	7694
1920	3,110,036	10367
1930	3,866,023	12887
1940	4,466,000	14900

1628 The available methods for the sewage disposal of large cities comprise dilution, screening of the sewage, sedimentation, which is removal of the settling suspended matter by settling in various types of tanks, chemical precipitation, broad irrigation or land irrigation, intermittent filtration, contact beds and sprinkling filters. These methods may be used in combination, according to local circumstances or conditions. Sterilization by the use of chloride of lime, or liquid chlorine, may also be used on raw sewage and effluents of treatment works.

Screening is useful principally to remove coarse floating material. Sedimentation may remove most of the settling suspended matter, and improve the stability of the liquid from 15 to 25 per cent. Chemical precipitation will remove somewhat more of the settling suspended matter and some of the colloidal matter. In order to make a stable effluent after the suspended matter has been removed, treatment to oxidize the organic matter is required. This is frequently carried out in bacteria beds or biologic filters. Such processes include broad irrigation, intermittent filtration, contact beds and sprinkling filters. These methods, however, are not all equally practicable.

The methods of broad or land irrigation and intermittent filtration require very large areas of land. In the United States, broad irrigation is practically abandoned, save in the

arid regions, where it is of value principally for the water rather than for any other purpose. Intermittent filtration is not now installed for large cities, but is considered practicable for small towns under 10,000 population, where sand is cheap and land valuable. Sprinkling filters and contact beds are more practical for large cities as a larger population can be taken care of on smaller areas. Of these two, the sprinkling filter is most economical and efficient, as a rule.

The dilution method, by the use of the main channel and a supply of water from Lake Michigan, is the most economical and efficient, the surest and the most effective, in that it diverts all the sewage from the water supply, and 1629 works automatically; is not dependent upon any individual or individuals for its efficiency; and permits of self-purification of the sewage in the ordinary and natural way.

For handling the sewage of the Sanitary District in case the flow required by the legal ratio is restricted, settling would be the first step to bring about the removal of settling suspended matter. This could be followed by the use of sprinkling filters to produce a stable effluent, as required. Secondary settling basins would probably have to be used to remove the humus formed in the sprinkling filters. Sterilization by chloride of lime or liquid chlorine might be utilized on storm flows and sewage effluents as required by circumstances.

No allowance has been made for the industrial load, as it is recognized that whatever happens the industrial sewage would have to be cared for in any case. This means that the cost of handling the industrial sewage would be additional to all of the comparative estimates submitted. This has been recognized by the Board of Trustees, and special studies are now being conducted by the engineering department of the District to determine the methods of treatment for the industrial wastes, principally for those of Packingtown and the Stock Yards, and for the tanneries.

The dry weather sewage flows vary from 170 to 600 gallons per capita. An average flow of 300 gallons, about,

per capita, has been estimated from a study of the flows actually found on various typical areas by gagings made by the Sanitary District of Chicago. The storm flows vary considerably. Maximum storm flows have been found from 50 to 70 cubic feet per second per square mile on areas of some size, with a maximum of 128 cubic feet per second per square mile on small well built areas. Intercepting sewers planned for a flow equivalent to 900 gallons per capita daily are required to care for the first rush of storm flows, and the minor storms.

1630 Assuming that 4,167 cubic feet per second of water are available from Lake Michigan for dilution, the cost to the Sanitary District for handling population equivalent to diverted flows amounting to 10,000—12,000 and 14,000 cubic feet per second by means of these additional works are given in the following table:

COST OF CONSTRUCTION FOR SEWAGE TREATMENT ON ASSUMED DIVERSION OF 4167 C. F. P. S.

Items	Equivalent to Diversion of 10,000 c. f. p. s.	
Population Distribution Treatment		Net Load in Population.
Lawrence Ave,		997,000
West Side,		0
39th Street,		944,000
Calumet,		207,085
Dilution	1,562,500	
Less Floating,	300,000	
	1,262,000	
Less Factor Safety	362,000	
Net	900,000	900,000
		3,048,085

Costs	
Lawrence Ave.	$17,595,582.00
West Side,	7,170,045.00
39th Street,	17,549,206.00
Calumet,	5,106,957.00
Storm Water Disinfection,	1,545,988.00
Domestic Sewage Disinfection,	600,000.00
Aeration,	1,065,000.00
North Shore,	1,192,280.00
Public Utilities,	3,453,570.00
Paving,	365,843.00
	$55,644,471.00

1631 Forward,	$55,644,471.00
Interest during Construction, 21-1/4%	12,500,000.00
Legal and Administration, 10%	4,740,000.00
	$72,884,471.00

Population equivalent to a diversion of 12,000 c. f. p. s.,	3,600,000.
Population Equivalent to a diversion of 14,000 c. f. p. s.	4,200,000.

Cost Pro-rated from Cost for Equivalent to Diversion of 10,000 C. F. P. S.

Pro-rated for increase of population from 3,000,000 to 3,600,000 equivalent to a diversion of 12,000 c. f. p. s.	$87,200,000.00
Pro-rated for increase of population 3,600,000 to 4,200,000 equivalent to a diversion of 14,000 c. f. p. s.	101,900,000.00

No allowance has been made for the cost of the existing works in this table. The total costs of the projected works on the allowance of 4,167 cubic feet per second, added to the existing works, is given in the following table:

COST OF WORKS FOR SEWAGE DISPOSAL COMBINING COST OF NEW TREATMENT WITH EXISTING INVESTMENT BASED ON DIVERSION OF 4167 C. F. P. S.

Treatment Equivalent to Diversion of Cu. Ft. per Sec.	Construction Cost of New Works	Construction Cost Existing Works	Total Construction Cost
10,000	$72,884,471	$64,095,082	$136,979,553
12,000	87,200,000	64,095,082	151,295,082
14,000	101,900,000	64,095,082	165,995,082

The annual cost for sewage treatment is shown on the table as follows:

1632 ANNUAL COSTS FOR SEWAGE TREATMENT ON ASSUMED DIVERSION OF 4167 C. F. P. S.

Item	Basis 10,000 C. F. P. S.
1. General Expenses,	$30,000.00
2. Sewers,	23,000.00
3. Pumping Stations, 4910 W. H. P. at $350	1,820,000.00
4. Sedimentation at $0.15 per capita,	456,000.00
5. Sprinkling filters at 0.10 per capita,	214,800.00
6. Aeration at 0.08 per capita,	171,840.00
7. Disinfection,—	
Storm Sewage,	433,800.00
Domestic Sewage,	370,000.00
	3,519,440.00
8. Depreciation,	1,182,157.00
Total,	$4,701,597.00
9. Pro-rated for increase of population from 3,000,000 to 3,600,000 equivalent to a diversion of 12,000 c. f. p. s.	5,650,000.00
10. Pro-rated for increase of population from 3,600,000 to 4,200,000 equivalent to a diversion of 14,000 c. f. p. s.	6,590,000.00

This scheme contemplates the construction of intercepting sewers based on a dry weather flow of 300 gallons per capita per day, carrying flows up to 900 gallons per capita per day to Central points for treatment. Above this amount, the storm flows would be discharged into the Chicago River or Calumet River, with sterilization; special tanks being provided to give a contact of 10 minutes on flows based on the maximum peak discharges. Coarse screens and grit chambers are contemplated, with facilities for cleaning. Set-
1633 tling basins are also to be built of the double deck type for dry weather flow, with capacity up to 900 gallons per capita. Sprinkling filters are estimated for the excess population which cannot be cared for by the extended use of settling tanks. The estimates include the sterilization of all the sprinkling filter and settling tanks effluents before being discharged into the Chicago River or the Canal. The double deck tanks would be designed on a basis of two hours retention of 300 gallons per capita daily in the settling chamber, and six months retention of sludge. The sprinkling filters would be designed on a basis of 12,500 people to the acre, the filters being assumed to be 6 feet 4 inches in depth of filtering stone. Secondary settling tanks are to be used for the filters, nominally of half the size of the primary settling tanks.

The estimates given are based on the current cost of sewer construction in the City of Chicago, due allowance being made for the probable character of the work, the cost of labor and material, and the character of the excavation to be made. The cost of the pumping station is based on $500 per water horsepower, the amount being adjusted slightly to scale down for the larger installations. Such costs are based on the known cost of the existing pumping stations in the city of Chicago. The cost of the settling tanks and appurtenances is based on careful estimates made from detailed drawings for a unit plant designed to care for 40,000 people. The appurtenances include a Venturi Meter, grit chamber, sludge drying beds, office building, laboratory, walkways, roadway,

electric lighting, and the general appurtenances required. The cost of land has been estimated from actual cost of land purchased by the District for its right-of-way for channels, and current sales of real estate in the City of Chicago. In each case, an allowance has been made for the probable increase in future costs.

1634 The annual cost includes an allowance for labor, repairs and supplies for the operation of the grit chamber, settling basins, sprinkling filters, secondary settling basins, the cost of labor and supplies for the disinfecting plants; the cost of labor, fuel, supplies, and repairs for the pumping stations; depreciation on all structures; interest during construction at 4¼ per cent for the entire construction cost for one-half the period estimated for construction. The allowance however made on land is the interest on the cost for the entire period. In the making of the estimates for sterilization, chloride of lime has been used as a sterilizing agent for the effluent of settling basins and sprinkling filters, whereas liquid chlorine has been estimated for handling the storm flows, in order to have available a large potential supply of chlorine for immediate use on sudden storms.

The capitalized cost of the foregoing schemes, including in capitalization the construction cost, as well as the capitalized cost for maintenance, operation and depreciation are given in the following table:

CAPITALIZED COSTS OF SEWAGE TREATMENT BASED ON DIVERSION OF 4167 C. F. P. S.

Treatment Equivalent to Diversion of Cu. Ft. per Sec.	Construction Cost	Capitalized Operating and Depreciation Cost	Gross Capitalized Cost
10,000	$72,884,471	$110,625,800	$183,510,271
12,000	87,200,000	132,941,100	220,141,100
14,000	101,900,000	155,058,800	256,958,800

These costs are supplemental to the present expenditures made by the Sanitary District which have been given as construction and operating costs.

The combined total costs, covering construction and capitalized annual maintenance and depreciation, combining the existing investment of the District with the investment required to produce with a reduced flow of 4,167 cubic feet per second the equivalent of conditions of flow of 10,000—12,000 and 14,000 cubic feet per second are given in the following table:

1635 CAPITALIZED COST OF SEWAGE DISPOSAL COMBINING COST OF NEW TREATMENT WITH EXISTING INVESTMENT BASED ON DIVERSION OF 4167 C. F. P. S.

Treatment Equivalent to Diversion of Cu. Ft. per Sec.	Capitalized Cost New Works	Gross Capitalized Cost of Existing Works to Dec. 31, 1913	Total Gross Capitalized Cost
10,000	$183,510,271	$76,067,600	$259,577,871
12,000	220,141,100	76,067,600	296,208,700
14,000	256,958,800	76,067,600	333,026,400

Studies have been made of receipts from taxes in the past by the Sanitary District, and a study has been made of the probable increase in the taxable value of property within the Sanitary District, so as to estimate the amount of bonds that can probably be issued by the Sanitary District, and from these have estimated what the highest possible income could be up to 1925, by issuing all of the bonds it is possible to issue, and getting all of the money from general taxation that it is possible to get, and the amount available from 1914 to 1925 inclusive would be $54,729,000 approximately.

There has been compiled from the books of the District and from estimates the probable investments required in the next ten years to cover extraordinary repairs and to settle obligations on contracts, assuming that all existing contracts for construction are terminated on December 31, 1913. This includes the amounts necessary to complete the North Shore and Evanston intercepting sewers, to improve the Des Plaines River in the territory recently annexed, to adjust the conditions in the North Branch of the Chicago River, to build cer-

tain docks in the Main Channel, repair walls at Lockport and Joliet, and to carry a share of the expense of handling the industrial wastes. This amounts to $11,577,000. This
1636 would be deducted from the available resources given, thus reducing the net amount available for new works to $43,152,000 approximately.

It would not be possible to finance this plan with the net revenue available within ten years. Not only would the construction costs have to be met, but also certain operating costs, as parts of the works were finished and put into service.

1641 A diversion up to the full capacity of the rock section, viz.: 14,000 cubic feet per second is the most economical way of developing the resources of the Sanitary District for sewage disposal and is shown by the following table which shows the amounts which would have to be expended by the Sanitary District under the different alternative methods, first of dilution, and second of treatment, to produce approximately the same result in the treatment of the sewage. This scheme for treating the sewage with a diversion of 4,167 cubic
1642 feet per second, and the use of the supplemental works, is not as effective in protecting the water supply as the diversion of from ten to 14,000 cubic feet per second.

COMPARISON OF CAPITALIZED COST TO SANITARY DISTRICT FOR EQUIVALENT DIVERSIONS OF 10,000, 12,000 AND 14,000 CU. FT. PER SEC.

Existing Works plus Treatment on Basis of Diversion 4167 Cu. Ft. per Sec.	vs.	Extension Dilution from 10,000 to 14,000 Cu. Ft. per Sec.

Equivalent Diversion of Cu. Ft. per Sec.	Existing Works with 4167 C. F. P. S. Plus Treatment	Extension of Dilution, Gross	Extension of Dilution, Net*
10,000	$259,577,871	$76,067,600	$62,825,600
12,000	296,208,700	95,517,070	77,720,070
14,000	333,026,400	102,519,910	80,213,900

* This allows credit for Electric Dept. earnings.

As to the efficiency of the various methods of sewage treatment, the factors taken into consideration, in reaching the above conclusions are:

One factor is that of the known methods in 1887-1890, and even up to 1900. The present method of dilution is the only one available for handling the sewage of cities over 100,000 population, which has survived the test of time. We have definite knowledge of the workings of the Main Channel from 1900 to 1913, with the severe tests which actual continued use imposes. Of the alternate schemes, no one can show a continued use so long, nor an application on so large a scale.

Another factor has been the attitude of sanitary engineers and sanitarians in general. There is no sanitary engineer or expert qualified to speak authoritatively who does not say that the diversion method installed at Chicago is the best method for that locality. This opinion is found held not only by American but also by foreign experts.

For many years many engineers and others, particularly laymen, residing in and out of Chicago, had criticised the dilution method of sewage disposal, as exemplified in Chicago. In order to satisfy the Board of Trustees on this point, a testing station finally was authorized in 1909.

1643 This testing station has been running continuously ever since. The results obtained and the studies made on the canal and the Illinois River have only served to confirm my opinion that the method of diversion and dilution is the best, the safest, and the most economical for the local situation.

At this sewage experimental station at 39th street, and the second one at the Stock Yards, where the wastes of that industry are being tested at these places, we have tested out every known device that would be applicable to the treatment of sewage in this locality.

As an engineer, I have had serious doubts concerning the practicability of works for treating sewage on such a large scale. This does not come from fear or ignorance of the correct principles to follow, but is based on conservatism,

Wisner Exhibit 6, January 20, 1914.

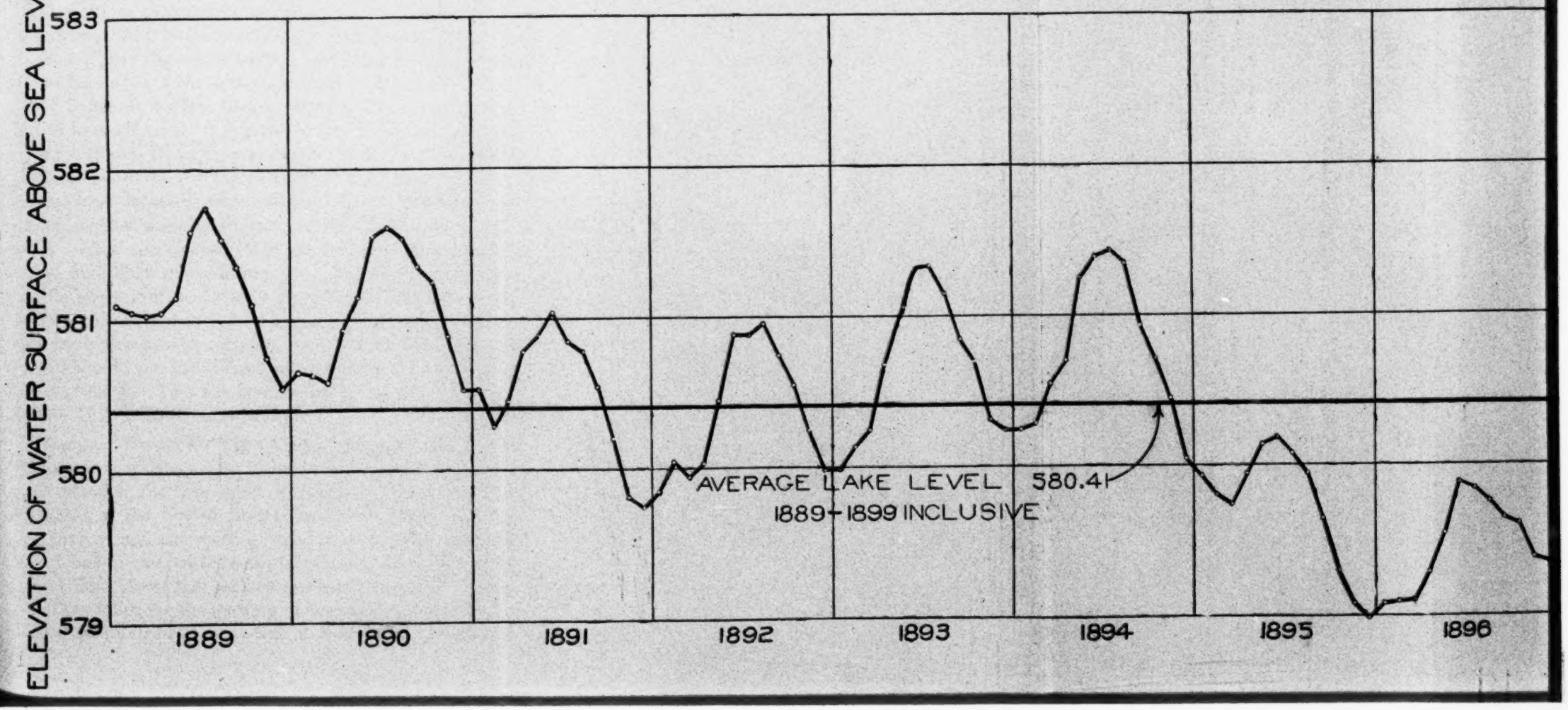


CHART SHOWING AVERAGE MONTHLY LEVEL OF LAKE MICHIGAN FROM 1889 TO DATE

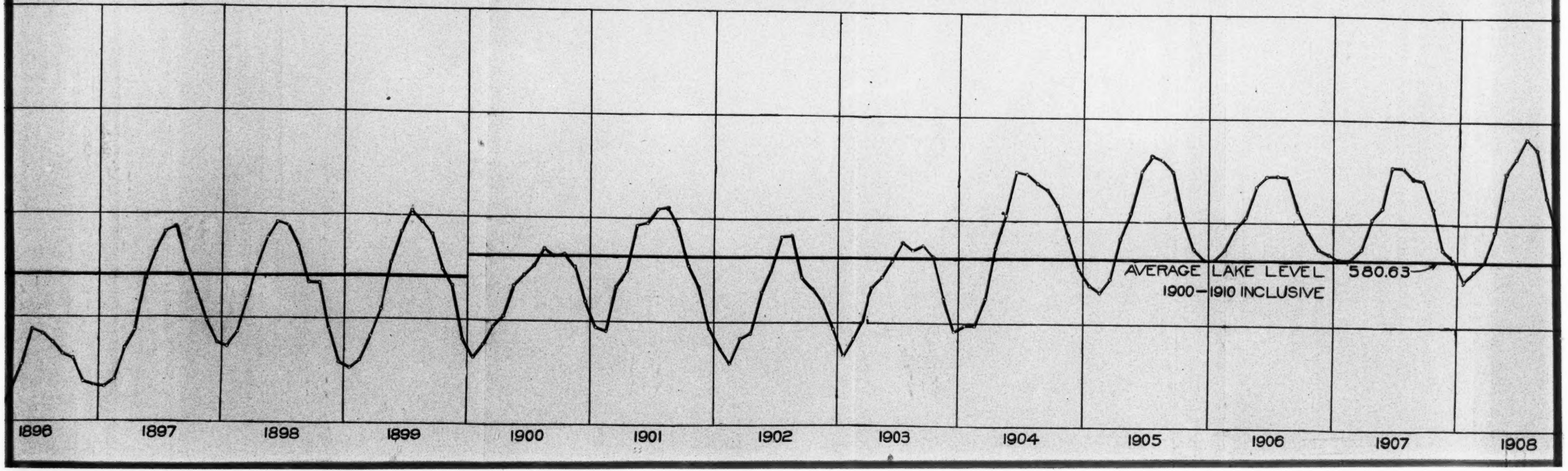
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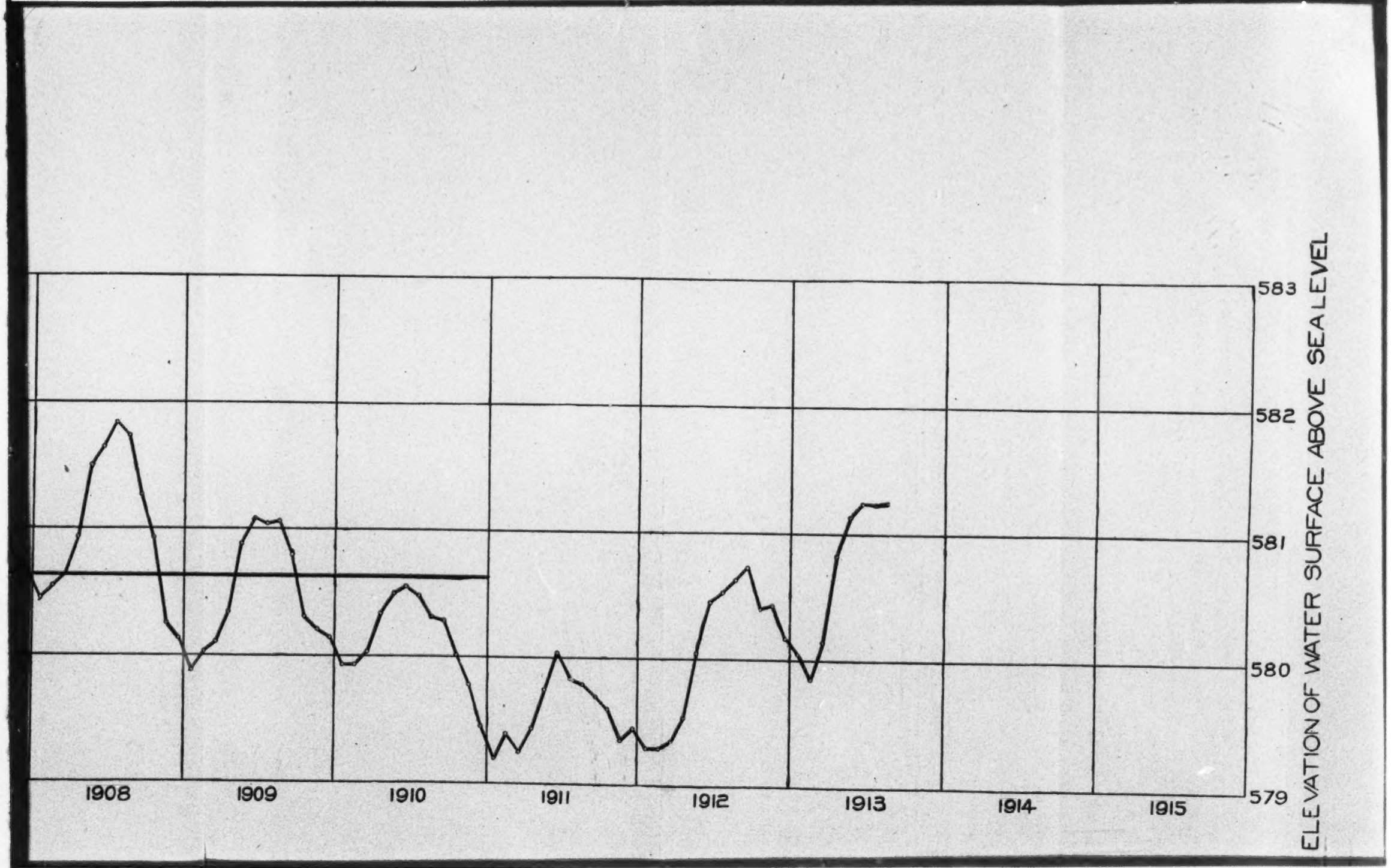
AVERAGE LAKE LEVEL 1889 TO 1899 INCLUSIVE

AVERAGE LAKE LEVEL 1900 TO 1910 INCLUSIVE

ENLARGED FROM UNITED STATES LAKE SURVEY CHART

AUGUST 1913




583
582
581
580
579
1908
1909
1910
1911
1912
1913
1914
1915
ELEVATION OF WATER SURFACE ABOVE SEA LEVEL

induced by lack of precedent anywhere for the partial or complete treatment of sewage on such a large scale. There are many novel problems involved. One of the greatest difficulties in the way is the securing of suitable sites. Judging by the opposition developed in Chicago recently in the various wards to the location therein of garbage treatment plants, I would anticipate serious delay in obtaining the sites desired. Public sentiment, even though wrong, is slow to recognize the necessity of certain locations. Another condition that might work adversely to artificial sewage disposal is the climatic conditions of Chicago, where severe winter weather is encountered. Most of the plants that I have seen in operation do not have the severe winters that Chicago experiences.
1644 So far as the towns in the Illinois River Valley, exclusive of Joliet on the Des Plaines, are concerned, ample dilution has been afforded. It is possible that if only the natural flow of the Illinois River were available that the low flow would be insufficient today for the dilution of their sewage alone, provided local nuisances were avoided. Coarse screening and possibly sedimentation might have to be installed. The cost of this I have not studied, other than to note the probable need of additional expenditures over and above those now made for sewer systems. On the Des Plaines River, however, Joliet would have had an absolutely inadequate dilution, which would have necessitated complete treatment of the sewage at a probable cost, pro rated from our estimates for Chicago of about $1,000,000. This has been saved by the flow from the Sanitary District to the City of Joliet.

A diagram (Wisner Exhibit 6 shown on opposite page) has been prepared which has been brought up to date, month by month, showing the lake levels at Chicago, taken from the publication of the United States Engineer's Office, and the Lake Survey, and corrected to date in accordance with the monthly bulletin issued from the office of the Lake Survey at Detroit. This shows that the average lake level for the eleven years following the opening of the canal was 580.63 ele-
1645 vation referred to mean tide at New York, or 0.22 of a

foot higher than the average lake level for the eleven years prior to the opening of the canal, which was 580.41 elevation referred to mean tide at New York.

High lake levels will increase the cost somewhat of new sewers by reason of the ground water, but the principal influence is in retarding the efficient operation of the sewers by backing up the water in the sewers to a greater distance from the mouth, and probably permitting thereby the stranding of solid materials which is very undesirable. The engineer in constructing the sewerage system plans to put the sewers at a certain depth below the surface to permit discharges of liquids from cellars and to get grades which will produce safe velocities at low flows. With the flat topography of the City of Chicago and the back water produced by the lake, it is extremely important to produce the best working conditions on the intercepting sewer systems, which necessitates pumping and great increased cost.

Frederick P. Stearns, a witness for the defendant, his qualifications being heretofore given, (This Narrative p. 134) testified as follows, October 13, 1913, (Vol. II, pp. 1074, 1075):

The canal was built for 10,000 cubic feet a second, and I believe has a still larger capacity. And it was built to reverse the current in the Chicago River, so that that river which receives sewage should not be turned into the lake. And time is an important element in producing any change in sanitary conditions; and I do not believe that if the quantity were diminished to 4,167 cubic feet per second, that the city could catch up with those conditions, even. If the quantity had been fixed originally, they might possibly have purified the sewage to the extent so that they could get results from that quantity which were fairly satisfactory, except for the reversal of the river currents. There is a necessity for reversing, also, in ordinary times, the current of the Calumet River, in my judgment, so that the ordinary flow of the Calumet River should not be into the lake.

George W. Fuller, a witness for the defendant (Rec. Vol. III, p. 1409-1515) November 17, 1913:

Resides Summit, New Jersey; place of business New York City; hydraulic and sanitary engineer, making a specialty of matters of water supply, water purification, sewerage and sewage disposal; graduate of Mass. Inst. of Tech. in 1888; studied at Berlin Hygenic Institute, took special courses relating to the practical art of water filtration, 1888; 1890 in the office of Piefke, engineer of the Berlin Filters; 4½ years on Technical Staff of Mass. State Board of Health; at Law-
1410 rence from spring of 1891 until the autumn of 1895. The station at Lawrence was conducted by the Mass. State Board of Health with a view to ascertaining the best means of purifying water and sewage under local conditions in Mass.; succeeded Mr. Allen Hazen in March, 1893, as the man in charge; was 4 years at Louisville, Ky., and Cincinnati, Ohio, in ascertaining the best means in point of efficiency and economy of purifying the muddy polluted Ohio River water; since summer of 1899 has been in practice in New York City; 1901-1911 in partnership with Rudolph Hering in hydraulic and sanitary work; was connected with upwards of 100 different sewage disposal projects and an equal number of water supply and water purification projects; for 9 years was a member of the Board of Advisory Engineers at New Orleans, having to deal with the expenditure of some $20,000,000 on drainage, sewerage and water supply projects; connected with the Passaic Valley Trunk Sewer project in New Jersey, with regard to getting out the preliminary estimates of cost of that project to serve about 1,600,000 people; has been connected wtih the litigation before the U. S. Supreme Court in connection with the pollu-
tion of N. Y. Harbor waters by that sewer; connected
1411 with the design of the sewage treatment works at Columbus, Ohio, serving as consulting engineer during their construction similarly at Reading; was connected with sewage disposal designs in thirty or forty different instances, the more recent ones being Atlanta, Georgia, Schnectady, New York, Al-

toona, Pennsylvania, Norristown, Pennsylvania, and a group of cities in New Jersey in what is known as the Plainfield District. On water supplies, was a member of the committee appointed in 1901 by the U. S. Senate to consider water supply matters in point of purification of the City of Washington; consulting engineer for New York City, both as to Catskill project and the existing Croton water supply; also connected with water supply projects, including St. Louis, New Orleans, Louisville, Cincinnati, Columbus, Ohio, Minneapolis, Grand Rapids, Montreal, etc. Has followed the development of the art of sanitary engineering in Europe; made a number of visits to Europe for that purpose. During
1412 the World's Fair in 1893 at Chicago had spent a number of weeks and had charge for a time of the exhibit of the Mass. State Board of Health; took occasion then to look into the water supply and sewage disposal matters at Chicago; 1901 was called in as expert by the St. Louis Water Department with reference to the treatment of the then existing water supply of St. Louis; in 1903 was one of the experts in the Drainage Canal litigation, *Missouri* v. *State of Illinois*, with Mr. Rudolph Hering; made an investigation and report to the International Waterways Commission with reference to Chicago Sanitary District; 1909 had to do with testing a filter plant in the stock-yards district.

The witness testified further as follows:

1413 Was familiar with the conditions at Chicago in 1889 and prior thereto, and prior to the opening of the Drainage Canal in 1900.

Briefly stated, in 1889, the sewage of the residents of this community adjoining the lake front, and for some distance back from the lake front, discharged into the lake. The water supply was then taken from a number of cribs connected by a tunnel, and located in Lake Michigan at comparatively short distances from the shore. I speak of dis-

tances to emphasize the point that the tunnels were then not so far out into the lake as at present. The sewage from portions of this district removed from the lake shore discharged into the Chicago River and its various tributaries.

There was at Bridgeport an old pumping station of a capacity of something like 1,000 seconds feet; and the purpose of that station was to lift the sewage polluted waters of the Chicago River, and send them through the old Illinois and Michigan Canal down into the Valley of the Des Plaines River in the vicinity of Lockport. The water supply conditions in point of pollution with sewage were notoriously bad, as shown by the records of death rate from typhoid fever and other water borne diseases. The pollution of the lake water at the intake-cribs, where the water was drawn for the public supply of this district was brought about, with substantial regularity, by the flow of sewers discharging directly into the lake. The conditions at certain times were much worse than this, and then the accumulations of sludge in the Chicago River and its tributaries, at times of very heavy rainfall, were flushed out into the lake and unquestionably had a very deleterious influence upon the hygenic quality of the water supply at the intake cribs, and as sent to the water consumers of this general district.

That outlines the condition in 1889, so far as the main features are concerned.

1419 In 1889 as regards the protection of water supply, the larger cities having the foremost sanitary advisors, recognized the importance of keeping sewage out of water supplies. That was about the date when the early beginnings were made of separating sewage from water supply. In some instances, efforts were being made to locate new intakes for cities situated on rivers, so that the water would be taken from above the discharge of sewage. It was recognized that where this was not feasible, intercepting sewers should be built for river cities, so that the sewage would enter the stream below and not above the river intakes.

There was at that time nothing known at all about the sterilization of public water supplies. In this country, there were practically no water filters in towns of any considerable size. For 20 years the art of water purification had been dormant.

In the late sixties, Mr. Kirkwood, one of the leading American engineers, studied water filters as practiced in Europe, and had made an extensive report in the interests of the City of St. Louis. It was not thought wise, however, to build filters from information then available.

1420 There were one or two filters built in the Hudson River Valley at Poughkeepsie and Hudson, New York, but with that exception, there were no sand filters in existence in this country.

Mechanical filters, as now known, were practically unheard of and were then merely crude straining arrangements in use in mills and other industrial establishments, with a few scattered plants that were just beginning to be installed for some municipal supplies. In those days, the germ theory of disease, as I have already explained, was not generally recognized; and while there were sand filters in Europe, they were essentially clarifying devices, and the benefit to the hygienic quality of the water appeared to be a mere incident. In other words, there was practically nothing known in the art of filter filtration which had associated with it well defined laws which would allow hygienic accomplishments to be reliably secured. American engineers were afraid of water filters in those days, owing to the wide differences in climatic conditions as compared with European facts and conditions; and furthermore they had nothing to serve as a practical guide as to how they should build the filters to secure effective accomplishments at all times, under the wide range of local factors, climatic, and relating to the water itself.

I can best illustrate the negligible working art of water supply in 1889 by saying that I was at that time connected with the Massachusetts State Board of Health, and even a little later on their attitude was one of not knowing how to advise

the City of Lawrence to filter a grossly polluted water supply, at a time when severe epidemics of typhoid fever were raging.

In fact it was not until 1892 that experiments even were made at the Lawrence Experiment Station to work out what might be called the laws of filtration, which are the basis of water filtration of subsequent years.

1421 The hygienic improvement in the Chicago water supply due to the Drainage Canal is decidedly greater and better than could have been obtained by improving the water supply in other ways as known to the art of 1889. In other words, the diversion of the sewage from the lake and from the Chicago water supply was far better than to have attempted to try any other means for getting a pure water supply, as those means were known in those days.

At that time there were three methods that were studied for large cities. There was the dilution method, which was by far the most prevalent method, and there were available two other methods which had been tried somewhat in certain of the European countries where large centers of population had sprung up upon very small water sheds. Those methods other than the dilution method were known as chemical precipitation and land treatment. In explaining these last two terms, I will say that land treatment grew out of an effort to apply sewage to farm lands, in order to take advantage of the manurial properties of sewage.

It had been tried, for instance, here in the Chicago district, at Pullman, and it was found that the land was not suitable for such purposes.

In regard to chemical precipitation, that was a method of applying certain chemicals like lime, alum and iron sulphates to sewage, allowing the treated sewage to pass through tanks holding several hours' flow;and in the tanks there would be deposited the course sewage filth. Those chemical precipitation works in England that were then in existence, had their origin also in efforts made commercially to secure the manurial properties of the solid sewage substances. They were not

a success commercially, as to the securing of fertilizing properties at a cost which would be at all warranted on a large scale. They were essentially clarifying arrangements, and were then in considerable vogue, owing to the efforts
1422 made in London to clear up the lower Thames, which had very foul decomposing banks of sewage sludge in its lower reaches.

I might say that there were some little contrivances, called clarifying or straining arrangements, which were practiced at places like Atlantic City and Long Branch, in order to keep the sewage solids away from the more prominent sea shore bathing beaches, but they were very short lived and are not worthy of any serious consideration in a project such as then existed at Chicago.

Chemical precipitaton method did not produce a treated product so that you could safely discharge that treated sewage, clarified sewage into a stream or into a lake and have a safe water supply. It was a clarifying process and not one for removing completely disease germs. In fact it was applied, not with a view of protecting water supplies but solely to eliminate sewage sludge, prevent these foul decomposing masses of sludge, and that alone was its true function. It was not a means of protecting a source of water supply.

Sewage farming method in this country, has never been used with any success commercially. In fact, the method, even in our arid western states has had a very limited and merely nominal scope of usefulness. The reason of that is that it costs more to get the sewage to farm lands surrounding a large city than is the worth of that sewage for fertilizing purposes, or for irrigating purposes, or for the two combined. That is very well demonstarted by the experiences of Los Angeles, for instance.

Twenty years ago, the sewage from the outfall sewer at Los Angeles was used in sewage farming, but the resentment of the public to having garden truck come in from districts where it was known that sewage was used on the farm lands,

the odors which arose from the pooling of the sewage on the farms, and the interference with land development projects even miles away from sewage farms, all led that city, with a rainfall of only ten or twelve inches per year, to abandon sewage farming and build a new outfall sewer to the Pacific Ocean.

What I have said with regard to Los Angeles applies, to every other sizable city in our arid districts. It is not difficult to find references in official publications to
1423 some nominal use of sewage for sewage farming in the western states, but a careful examination such as I have given to these subjects, shows that the sewage has been used simply for its irrigating purposes, at times when it would be of benefit to the farmer, and that on other occasions it has been diverted to the nearest water courses.

In our eastern states, the matter stands in quite a different attitude, because the rainfall is generally sufficient for farming purposes, and when there is ample rainfall the farmers are in all cases, disposed to divert the sewage to some water course, or to allow it to build up on certain portions of the farm lands where it putrifies and produces nuisances.

Briefly stated, the attitude and experience in this country with regard to sewage farming, I would say that the method has never become well established, even for small cities, and it is entitled to no established footing or standing for the problems of large cities. That is true in the west, and still more so in our eastern states.

In 1889, I take it all sewage was disposed of by dilution. There are some instances where sizable towns have grown up on very small streams, where treatments works of some kind or another have come up for consideration, but today it is safe to say that somewhere from 93 to 96 per cent. of the sewage of all towns and cities is disposed of by dilution. Where it is not so disposed of, the dilution method is not a candidate for consideration, because of the small volume of water available for diluting purposes.

There are a few other exceptions along harbor towns, for instance, where shell fish pollution has been a factor.

Broadly speaking then the dilution method which was practically in universal use in 1889, has continued to be the prevailing one. In fact it is always applied to-day where the conditions allow of its being applied under reasonable conditions.

The sewage farming method that I have spoken of already is on the wane decidedly, in Europe. The largest sewage farm in England, at Birmingham, has been practically abandoned. In Paris, it is being gradually given up, and, beginning a couple of years ago, they are installing sprinkling filters to take the place of sewage farms now located in part in the growing suburbs of the district.

1424 In Berlin, the sewage farms are still used, where the conditions are very favorable as regards light, sandy, porous soil, on lands that were purchased many years ago at a very low price, and where the rainfall conditions allow the irrigating value of sewage to be taken advantage of, in a way that does not exist in our eastern or central states. The increment of land value alone at Berlin seems to justify a continuance of a method which is expensive at best.

The consumption of water percapita in Berlin, as compared with that in the cities of the United States, has quite a little to do with that problem. The amount of water consumed in Berlin is only about 30 gallons per capita as compared with 200 gallons and more found in many of our American cities. That has a good deal to do with the cost of intercepting sewers, pumping stations, and works for delivering the sewage to the farms. And it requires a much smaller area per capita in European cities than would be required in our American cities.

Chemical precipitation works in 1889, had been recommended for adoption in Providence, and those works were built after an interval of some 14 years, put in service in 1901, following the recommendation for adoption in 1887. Their

purpose was to eliminate sewage mud from the Providence Harbor, and to prevent the foul decomposing conditions there found.

That method of chemical precipitation at Providence, was continued until a year or two ago, when it was superseded by plain sedimentation and sterilization of the sewage, for the purpose of protecting the shell fish layings in the Providence River below the outfall from the treatment works in the deep water at Field's Point.

At Worcester, under orders of the court as the result of litigation on the part of the riparian owners in the lower Blackstone River, the City of Worcester about 1889 started to build chemical precipitation works, which were completed in 1891. Those works were enlarged a few years later, and are in service today to treat some of the sewage, which, for the most part however is now being treated in works of more modern, economical and efficient design. The few little chemical precipitation plants around Coney Island, and some of the beaches of greater New York, at Canton, Ohio, East Orange, New Jersey, and a little plant in the Mystic Valley just outsde of Boston, have all been abandoned.

1425 It is a fair general statement to say that the chemical precipitation method has no standing today in this country for disposing of sewage as regards elimination of sewage nuisances, except perhaps for some small problems where there are complicated trade wastes. Its day has come and gone, and I think that statement applies also to the large European cities generally speaking. It is certainly true of London, where this method of chemical precipitation received its great impetus in the late eighties.

Since the days of 1889, there has been quite a substantial advance made in treatment works for sewage, that has come in as the result of the pressing needs of some communities located on small streams, where the dilution method could not be satisfactorily applied in order to remove a nuisance in those streams.

Continuing the developments of the art since 1890, I will say that various methods have come up for the consideration of the solution of sewage treatment problems. From about 1895 to 1900, the so-called single story septic tanks were in vogue. Their purpose was to remove the solid sewage filth, and allow it to become septicised, and in early days it was assumed all solid sewage filth could be liquified, and gasified by bacteria. Practical developments have shown that this was not feasible.

More than that, the practice with large cities has shown that very severe complications in point of nuisance have been brought about, as the odors from septic tanks have arisen.

Recently, septic tanks of the single story type, built so frequently a dozen years ago or so, have been practically abandoned for all large municipal projects. Within the last year, there has been put in service at Atlanta a two story tank, a settling and septic tank, which has proved to be of much practical benefit, according to the data now available. This is the method of clarifying sewage that has superseded both the chemical precipitation of 20 years ago and the single story septic tanks of a dozen years ago.

In regard to methods of oxidizing those portions of sewage which are either in solution or will not settle in settling tanks, there has been a radical change in the art from 1889, when sewage farms were almost exclusively used.

First there was developed in Massachusetts the intermittent sand filter, where sewage was applied to large areas
1426 of porous sand found in place in sections where glacial drift formation was noted. In the central, western and southern states, that method had no footing because the porous sandy deposits did not exist in place, and the method was found to be too expensive when sand beds had to be built artificially.

Next, there came, about 1900, the so-called contact bed in which beds of stone were filled with sewage, and allowed to have the pores stand full of sewage, for a few hours when

the bed was drained and allowed to have its pores filled with air. That method was found to be prohibitively expensive for large projects, and its use today is confined to small communities in residential districts, where the effort is to minimize the odor question.

In places where water cannot be made available for oxidizing clarified sewage, so as to prevent sewage nuisances, it is found that the so-called sprinkling filters are the best means of making sewage stable or non-putrescible. By that I mean the treatment of sewage, so that it will no longer putrify after treatment, and after standing for an indefinite period. These devices are large beds of stone, perhaps one to three inches in diameter, and six feet or more deep, and on to which the sewage is thrown in the form of a spray from numerous spray jets, spaced perhaps ten feet apart, over the surface of the bed. The practice has shown that these devices will produce a non-putrescible effluent; but it has also been found, at Columbus and elsewhere, that unusual care must be taken for large projects, to keep the sewage in a fairly fresh condition, so that very serious odors will not arise in the neighborhood of the sprinkling filters. These odor factors have not been encountered in the smaller plants, and in a large scale, the art now shows means of guarding against the odors by keeping the sewage well aerated, and thus arresting putrefaction of the liquid before it meets the sprinkling filter beds.

In the general developments of the art of sewage treatment works, practice has shown that it is much more expensive to build and operate these works on a satisfactory basis than was anticipated a few years ago. In fact, the experiences of the past year or two indicate clearly that projects now in service involve considerably larger sums of money than the earlier estimates indicated.

One other factor I should mention in the art of sewage treatment works, and that is the sterilization of sewage to attempt to destroy disease germs.

Nothing was known of sewage sterilization on a practical scale until about 1906. It was then tried at Red Bank,
1427 New Jersey, to apply hypochlorite of lime in settling tanks to sewage with a view to reducing the number of disease germs in the liquids that were sent out in tide water, in the vicinity of shell fish layings. There have been a number of projects recommended for the sterilization of sewage, but so far as I know there is no instance where large cities have made public any records as to experiences in the systematic sterilization of sewage. The nearest approach to it is at Providence, that I have already spoken of, and where they have abandoned chemical precipitation and started out on a tentative scheme of using their tanks to settle the sewage and to apply sterilizing processes in the interests of shell fish layings in Narragansett Bay.

I have been told also that recently the City of Toronto is attempting to sterilize its settled sewage before discharging it into Lake Ontario.

With regard to the dilution method, the greater attention given to sanitary matters in various parts of the country has shown that it was applied in earlier years with many shortcomings. By that I mean that sewer outlets were built into water courses to a very unsatisfactory degree. There are many American rivers and lakes where sewers reach only to within 100 feet or so of the water's edge, and show a pollution which has given rise to offensive conditions that do not exist or would not exist if the sewage had been well mixed with available water for dilution.

It is also found in some places that sewage has built up sewage banks or sludge deposits, which could be remedied with a little care.

So in brief, the dilution method in my opinion, as the result of careful study of the various engineers, now applying it on a more rational basis than in earlier years, is now on a firmer basis than ever before.

It is true however that it is suffering, in the public mind at least, from the poor reputation it got in earlier years, when it was applied in a very inadequate and haphazard fashion in a great many cities, with attending nuisances as to odor. Today I believe it is entitled to far more consideration than ever before, and I think that engineers in approaching these problems will give it in many cases more careful consideration than they would have done a short time ago, when it was not so clearly appreciated as to what the conditions were, under which it could be used, and take advantage of its economy and allow local nuisances not only to be eliminated, but to allow them to be eliminated in a way that they would not be transferred to other neighborhoods.

1428 The ratio of dilution, that is to say 3.33 cubic feet per second per thousand population, that is prescribed by the act under which the Sanitary District of Chicago is organized, in my opinion is as low a ratio as it is feasible to employ, when consideration is given to the domestic sewage of a community.

If I were to consider any change in this ratio, I should be disposed to increase it. That ratio makes no provision for trade wastes; and if trade wastes were to be considered as well as the domestic sewage, I believe this ratio should be increased.

I have looked into this matter with considerable care; have been down the length of the Drainage Canal, studied the records on may occasions. I am making this statement now with respect to conditions as applied to the Chicago Drainage Canal.

I take trade wastes to mean those products which arise in large industrial establishments, for instance tanneries, packing houses and slaughter houses, where the wastes are removed by water carriage, are substantial in quantity, and are entirely different from what you would get in sewers, which drain the ordinary residential community, with the wastes that would come from business blocks, commercial en-

terprises and small manufacturing establishments where the wastes that went into the sewers were merely nominal in amount. As applied here particularly to the Chicago problem, it relates essentially to the waste coming from the Stockyards district and to the tanneries and to the other establishments along the North branch.

Now, in this problem, I have given no consideration to the trade wastes item. The reason for that position is that the disposal of trade wastes is a matter which applies with equal force, whether on the one hand you are considering the dilution method for the local problem, or whether there are considered treatment devices for disposing of the sewage other than by dilution methods.

In other words, it is an item which appears on both sides of the equation in these dilution projects which I have studied; and being the same item on each side of the equation, it properly drops out of consideration.

1429 I might further say that it is my understanding that the Drainage Canal here was projected on the basis that trade wastes were not to be a factor ultimately in dilution ratios, or in other aspects as regards sewage disposal. It is a fact, however, that trade wastes have gone down the Drainage Canal, as an incident to the period during which the volume of domestic wastes has not required the amount of diluting water equaling the capacity of the channel.

I understand further that in the Department of Engineering of the District, there has been established a division, the purpose of which is to study various methods for treating trade wastes, without, however, any consideration, so far as I know, of the financial arrangements under which such treatment methods would be applied.

In my opinion, the protection of the Chicago water supply is secured in a more simple, effective, economical and therefore better way, than could be secured by any other means of treating the sewage than by the present method; and that applies to the art of 1889, and also to the art as known to-

day, in the matter of sewage diversion and sewage treatment.

A reduction to 4,167 cubic feet per second in the flow of lake water through the main channel and its adjuncts would create a profound and unfavorable disturbance in the fundamental principles upon which this project was designed and built. They would relate to several factors, which I will speak of in turn.

First, a flow of water from the lake of 4,167 seconds feet would defeat the main purpose of the channel, which is to secure at all times a reversal of flow of the Chicago River, in order to protect the water at the intake cribs of the Chicago water supply.

In other words, at times of very heavy rainfall, there would be a reversal of flow of the Chicago River carrying the
1430 river water and considerable sewage out into the lake, such as was the condition of affairs prior to 1900. That reversal would occur on a good many days in the course of a year; at least ten in the ordinary year, and a much greater number than that during years of abnormally high rainfall, or having periods of unusually high rainfall.

I wish to point out that even on the assumption that at times of heavy rainfall the flow down the channel would not be limited to 4,167 seconds feet, that, in a practical working way, this does not modify my statement above as to inability to secure a reversal of flow of the Chicago River such as is necessary in order to protect the Chicago water supply. The reason for that is that it takes a good many hours, half a day or so, in order to change the regulating works at Lockport so as to increase the volume of flow in the vicinity of the Chicago River down into the main channel and into the Des Plaines River. It is this lag of half a day or so, which in my opinion would prevent the practical operation of the Drainage Canal in times of storm flows, so as to secure the protection that now comes from the present method of operation with respect to preventing sewage getting to the intake cribs.

A third aspect of the proposition, assuming 4,167 seconds feet diversion from Lake Michigan water through the main channel and its adjuncts, would force to consideration other means of treating the sewage, which now is disposed of by the dilution method. That flow corresponds to the legal minimum ratio of dilution for about 1,250,000 people. Obviously the domestic sewage from a population in excess of that figure would require treatment works, or other means of eliminating sewage. This last proposition involves two aspects: One is the feature of the dilution of sewage, so as to prevent putrefication of the flowing sewage; and in the second place, with this assumed reduction in the flow of Lake Michigan water, the velocities in the waterways of the 1431 channels, main channel, Chicago River and the various appurtenances would be reduced so that the solid sewage matters would become stranded to an extent where sewage mud banks would arise, putrefy and produce seriously offensive odors.

To my thought, it means that with this reduced flow of lake water it would be necessary to settle all of the sewage so as to keep the sludge out of the waterways, as well as to provide means of protecting the water supply through the sterilization of all sewage. And it would further mean the use of sprinkling filters, or other devices, for rendering stable and non-putrefactive the flow of sewage in excess of that which could be properly diluted with this 4,167 seconds feet of lake water.

In the event that the flow of lake water were reduced, or limited to 4,167 cubic feet per second there are two styles of procedure, or two projects which could be adopted for protecting the water supply of Chicago and eliminating sewage nuisances.

The first of these (which I will call A) would involve the collection of the dry weather sewage flow and the first flushings of storm flows, after they pass through settling tanks and apply them to sprinkling filters, so as to render the sewage non-putrescible.

The sprinkling filters should be built to take care of the sewage flow from such portion of the population as could not allow its settled sewage to be adequately diluted by the 4,167 seconds feet of lake water. It would be necessary in protecting the water supply to sterilize this flow of sewage after its treatment by settling or sprinkling filters, or both; and it also would be necessary to sterilize the storm overflows at times of very heavy rainfall. The reason for this sterilization would be that if it were not sterilized some of this treated sewage or storm overflow, or both, being present in the Chicago River and its tributaries at the beginning of heavy downpours, would be sent out into the lake at times. Therefore, to be on the safe side and reasonably to protect the water supply, it would be not only necessary to settle or filter the sewage to guard against nuisance day by day, but it would also be necessary to sterilize these liquids to protect the water of the lake at the intake cribs.

1432 There is a second method of procedure (which I will call B) which would be a project involving, in the first place a system of separate sewers throughout the district for collecting the household wastes. That would mean a new set of sewers on all the streets where sewers now exist. It would mean that the rain water falling on the streets and roofs and various areas, yards, vacant land and parks, would reach the water courses through the present system of sewers; and that all house connections for all the properties of this district would be disconnected from the present system of combined sewers and shifted over to the proposed system of separate or sanitary sewers. The flow of such a proposed system of separate or sanitary sewers would then be treated by sedimentation and filtration to secure a product which would not produce putrefactive conditions in the channel, and this flow would also be sterilized.

Under this arrangement, the storm water which would reach the water courses through the existing system of sewers would go there without any treatment of any kind.

As these two projects have been developed, it is necessary, first, to state how the sewage would be brought to various places for treatment.

I will speak first of project A, in which the flow of sanitary sewers would be through the existing present combined sewers. Speaking generally, there would be intercepting sewers, which would run along the margin of the Chicago River, and at some other points, picking up the sewage from the lake front. These intercepting sewers would receive the settled sewage which would flow from the sewers as they exist to-day. By that I mean that the sewage flow would be led into settling tanks before it discharges into the water courses. This ordinary dry weather flow and the first flushings of storm water would then pass from the tanks to intercepting sewers. These intercepting sewers would lead to sprinkling filter sites in most cases, where the sewage, with some intermediate pumping, would all be lifted at the end of the intercepting sewers on to sprinkling filters, where it would be applied to beds of stone through various spray jets.

Speaking generally now of locations—I am looking at the map marked Fuller Exhibit 1, November 17, 1913—I will call attention to the fact that along the north branch, for instance, intercepting sewers would be built from Kinzie street on either side of the north branch to a point above Fullerton avenue, where the conditions would allow sedimentation tanks to be built. There are some sixteen sedimentation tanks
1433 which would be required along the north branch north of Fullerton avenue. The flow of sewage from these settling tanks would be into interceptors, which would lead on either side of the river to about Lawrence avenue. Thence they would unite in a single interceptor built, leading to a proposed sprinkling filter area, just north of the city limits between Devon street on the south and Touhy avenue on the north. This area lies immediately west of the present north shore channel.

These intercepting sewers would be built of a capacity of about 900 gallons per capita, with a population estimated

SANITARY DISTRICT OF CHICAGO.

MAP SHOWING

SANITARY DISTRICT BOUNDARY

AND THE

CORPORATE LIMITS OF CHICAGO.

JANUARY. 1904

SCALE OF MILES.

AREAS.

SANITARY DISTRICT, ORIGINAL	185.000 Sq.Mls.
NORTH SHORE ADDITION	76.600 DO DO
CALUMET ADDITION	94.800 DO DO
SANITARY DISTRICT, PRESENT	356.180 DO DO
CITY OF CHICAGO	190.638 DO DO
SAN. DIST. OUTSIDE OF CHICAGO	167.442 Sq.Mls.
Des Plaines River Addition	28.1 Sq.Mi.

SEWAGE DISPOSAL PROJECTS
OCT. 1913
Scale ½ in. = 1 mi.

Intercepting Sewer.
Sewage Pumping Stations.
Sedimentation and Disinfection Plants.
Sprinkling Filters.

LAKE MICHIGAN

INDIANA

R. 11 E. R. 12 E. R. 13 E. R. 14 E. R. 15 E.

T. 42 N. T. 41 N. T. 40 N. T. 39 N. T. 38 N. T. 37 N. T. 36 N. T. 35 N.

R. 10 E. R. 11 E.

DESCRIPTION OF BOUNDARY.

as of 1930 for the various areas tributary to these respective sewers.

There are, besides this so-called Lawrence avenue project, for treating the sewage north of the Chicago River, three other projects. The second one, spoken of as the West Side project, would involve the collection of sewage from the Loop District, and an intercepting sewer which would run along the west bank, or near the west bank of the Chicago River, to the vicinity of Western avenue. There the settled sewage, which at various outlet sewers would pass through settling tanks and into this interceptor would be lifted from the interceptor to settling tanks located between Western avenue and Kinzie avenue beyond the Bridewell; and thence the sewage from the western portion of the city in the sewers now existing and located north of the main channel would likewise return to this main settling tank.

Sprinkling filters, so far as required, would treat the settled sewage from this main west side plant at an area located north of the main channel, south of 39th street, and between South 64th and South Harlem avenues. These sprinkling filter sites in all instances are colored brown on this map.

The third main project, spoken of here as the 39th Street Project, would receive the sewage from the various sewers tributary to the present 39th Street Pumping Station. There on the lake front, settling tanks would be located, the flow of which would be pumped through a conduit which should receive also settled sewage from various main sewers in this area lying south of the Chicago River, excepting the Loop District, and south of the main channel. This settled sewage would be delivered for treatment in sprinkling filters to an area immediately south of that which I have previously
1434 described, that is south of the main channel, and lying between South 64th avenue and Harlem avenue.

There would be needed in this instance several pumping stations and settling tanks for the Stock Yards District and for the various sewer outlets now discharging into the river

or channel, and not tributary to the main pumping station at 39th street.

The fourth project, spoken of here as the Calumet Project, would involve an intercepting sewer starting in the vicinity of the 95th Street Pumping Station, taking the flow from the various centers of population in the Calumet District and leading to sprinkling filters lying just north of the Calumet River, south of 130th street, and lying immediately west of Cottage Grove avenue extended south. On this system of intercepting sewers, there would be settling tanks at the outlets of the various sewers and a number of pumping stations, all of which will be detailed in the estimates which I will consider later on.

On this map, the intercepting sewers are marked in red showing their location, and also with an arrow indicating the direction of flow.

The sewage pumping stations, at points where it is necessary to lift the sewage flow along the line of the interceptors, are shown with black circles, and the same black circles are used to indicate the pumping stations needed for lifting the sewage at each of the respective sprinkling filter sites. The sedimentation and disinfecting plants are shown in yellow with a heavy black margin around the area, and as I have already stated, the sprinkling filter areas are shown in brown.

I should explain that at all of these settling tanks, the flow of the sewers in excess of 900 gallons per capita for the 1930 population would have disinfection or sterilization plants where such excess storm flow would be thoroughly disinfected.

1435 Now, proceeding to what I have called the other project, Project B, the various treatment works would be located at the same areas as I have just described for Project A. The intercepting sewers, however, would be smaller because they would deal only with the domestic wastes and not receive storm flows. They would be, roughly, half of the capacity of the interceptors of Project A. The pumping stations would

also be smaller in size, on account of having no storm water to deal with.

I have assumed that the settling tanks, sprinkling filters and the interceptors, in point of location, would all be located precisely as in Project A.

By Project B, there would drop out of consideration, however, the disinfecting plants as regards storm water flows; but the treated sewage would in all cases be subjected to sterilization.

One further word about the sterilization should be added, and that is that where the sewage is subjected to treatment in sprinkling filters, the sterilization plant would deal with the filtered sewage after it had been subjected to a secondary sedimentation.

In those cases where the sewage is not passed through sprinkling filters, the disinfection would take place at the primary settling tanks, and adjoin the works for sterilizing storm overflows in Project A.

This map marked Fuller Exhibit 1, on page opposite, shows also a small project marked here the "North Shore Project," wherein is shown a system of intercepting sewers beginning in Glencoe near the northern district boundary line, coming through Winnetka, Kenilworth, down to Wilmette; there showing a pumping station and small treatment works for a population of 55,000 people estimated as of 1920.

In regard to the collection of the sewage flow from the present sewers discharging into the various water courses, I should state that in these intercepting sewers and appurtenances arrangement is made for areating the sewage. The purpose of that aeration is to prevent putrification taking place such as is found in a great many outfall sewers of large cities, owing to the age of the sewage. Now, to prevent and offset the putrification, which is due to bacterial processes taking place as the liquid flows in the sewer, provision is

made in these projects for pumping in air so as to keep the decomposition on an oxidizing and not on a putrifying basis.

With respect to the population, it will perhaps be more explicit to repeat a word or two, and say that these intercepting sewers for delivering the sewage flow to settling basins, 1436 sprinklers and treatment works, the design has been based on the assumed populations of 1930, namely 3,500,000 people. With respect to the treatment works, this is including the filters, settling basins and sterilizing arrangements, the population has been assumed as of the date 1920. On that date, the estimates of population show for the city a population of 2,900,000. In fitting these different projects to a population basis, there has been some little latitude used and there has been included the population of the Calumet District on the south and the North Shore district on the north.

The population provided for in my estimates is: Within the city, 2,900,000 population; outside of the city limits, in District 14 on the west side, 133,000; 21,000 outside the city limits in the Calumet District, and in the North Shore District 55,950. The latter figure includes Evanston.

Now, the summation of all of these different populations assumed to be provided for in the respective treatment works amounts to roughly 3,000,000. I have assumed in my estimate that that would be equivalent to what would be served by 10,000 seconds feet flow in the main drainage canal, equal to 3,000,000 people.

I am aware that in making estimates of future growths of population in different districts there are bound to be some discrepancies, and these aggregate figures are rather more liberal than should be made for the respective individual treatment plants.

I think next I will outline briefly the particular devices which it is proposed here to use in settling and filtering the sewage, and in sterilizing it; and refer roughly to what in practice elsewhere these particular devices have accomplished in the nature of improving the hygienic character of the

sewage, and with regard to the bearing which the works would have upon the elimination of sewage nuisances.

The settling tanks would be built of the two-story Imhoff type. By that I mean that there would be large settling tanks built with their flow line roughly corresponding to the flow line in the existing sewers. They would have a depth of some 25 feet, say, and be in two stories. In the upper compartment, the sewage would flow through the tanks for a period on an average of two hours. The increase in the cross-section of that settling compartment with respect to the size of the sewer so checks the velocity down to half an inch per second or so, with the result that there are deposited the coarse matters in the sewage.

In the bottom of this compartment is a slot or opening, through which the solid matters would pass to a large
1437 chamber beneath. This lower chamber is called a digestion chamber, and in it the solid matters would be allowed to accumulate for perhaps six months or so. During this interval bacterial decomposition would intentionally be directed and encouraged, so that it would gasify, putrify and allow the bacteria to eat up all of the unstable organic matters. Much of this solid matter would be changed to liquid and gaseous substances. The result of this is that the sewage sludge would become septicised or eaten over by the bacterial life, so that it would be taken out in a substantially inodorous condition.

This wet sludge from the lower compartment would be removed at intervals through a pipe, and applied to little thin beds of sand and gravel; and it so happens that the sludge as removed contains much gas. This is of importance, because when it is removed and applied to these straining beds or sludge beds, the gas seems to lift the solid matter to the surface, and it allows the liquid from the bottom to pass down through the sand and gravel of the bed to which it is applied. In the course of a week or so this septicised sludge has been so freed of water that it is spadeable, and can be

shoveled into containers for its removal to any convenient place to be used for filling, or to be stored in a spoil bank.

At these settling tanks along the various sewer outlets going into the water courses, arrangements would be made whereby the sewage flow passing through the tanks would be limited to three times the dry weather flow, or to 900 gallons per capita daily. The storm flow in excess of that quantity would not pass through the regular settling tanks, but would be subject to sterilization. By sterilization, I mean that there would be added to the storm flows liquid chlorine sufficient to kill the disease germs in the liquid and upon the exterior of particles of suspended matter. Sterilization is, of course, not effective in killing the germs in the interior of particles of suspended matter.

These tanks for purposes of sedimentation would allow the removal of some 90 per cent or so of the particles which are capable of settling. They do not of course affect at all those soluble matters in the sewage, such as urine, nor the fine particles of fecal matter, or substances of other origin which are so fine that they will not subside. That is, the non-settling solids and the soluble matters in the sewage pass through the settling tank and on into the intercepting sewers.

In the course of six or eight hours or so, sewage will become, under ordinary conditions in large cities, putrifying, and productive of foul odors to an objectionable degree.
1438 These intercepting sewers are supposed to carry sewage which has its content of oxygen not depleted; and the oxygen supply is assumed to be replenished by pumping air at intervals into the flowing liquid in the intercepting sewers. The quantity is, in accordance with various tests at New York, roughly, one-tenth of a cubic foot of air to one gallon of sewage.

In those cases where the settled sewage must be filtered, that is for all projects other than the West Side Project, the settled sewage will flow in these intercepting sewers and be pumped at the respective filter sites onto the sprinkling filters. I should say that for the West Side, I have assumed that

the settled sewage from the central west side area, from the Loop District and the floating population in the Loop District of some 300,000 people, that that settled sewage could be adequately diluted by 4,167 seconds feet flow of lake water, so that it would not be necessary to filter it.

The removal of organic matter by sedimentation is taken to be roughly 25 per cent on an average, as compared with the organic matter in the raw material. To reduce the organic matter of the settled sewage to a point where it will not putrify in the water courses, it is estimated that there would be required one acre of sprinkling filters for 12,500 population.

These sprinkling filters, as I have already stated, would be large beds of stone, of a size ranging from one to three inches in diameter, about six feet deep. To these filters, the settled sewage would be applied from a series of sprinkler nozzles, spaced roughly ten feet apart. The sewage would then be thrown as a form of spray such as from a lawn sprinkler over the surface of the bed of stone. These sprinkler filters operated at this rate will produce an effluent which will not putrify after there has been removed from it some suspended matters which are released from the bed in an irregular way.

To clarify this filtered sewage, these projects provide for secondary settling tanks holding about one hour's flow, and of about the same size structure as the primary settling tanks, but of one-half size for a given sewage volume.

This sewage sludge would be similarly strained on sludge beds to remove the water, so as to get it in a spadeable condition for removal to a sludge bank, or any other convenient way of disposal. The sludge has somewhat limited value for fertilizing purposes, and in some cases in Europe it is taken away free of charge by the farmers of the neighborhood.

I have assumed that it would cost some 50 cents a yard
1439 to get rid of this sludge, and that it would not be feasible to dispose of it to farmers.

Wherever the dry weather flow of sewage is subjected to filtration the sterilization process would be applied to the effluent after it leaves the filters, and not to the settled sewage before it reaches the filters. In the West Side Project where filters would not be needed with the present assumed volume of lake flow, the sterilization process would be applied of course to the flow from the primary settling tanks.

In the matter of efficiency of sprinklers, I would say that they will reduce the organic matter in the sewage some 70 per cent or more, and in connection with the oxygen present in the filtered sewage, they will produce a stable liquid which will not putrify upon exposure to sunlight and the air, for a long term. There are times when these beds unload their solid matter, when perhaps that would not be literally true; but generally speaking these beds, in practice at the rate here indicated would produce a liquid which would not give trouble from putrifaction.

The removal of bacteria by the sprinkling filters would probably range from 80 to 90 per cent. The liquid would be substantially free of suspended matter. The sterilization of the filtered sewage would have for its purpose, of course, the destruction of disease germs to the extent of the 10 or 20 per cent remaining in the filtered sewage as compared with that appearing in the raw sewage.

As to storm water flows, the liquid coming from the streets contains a good deal of organic matter, and would probably call for as much as 70 pounds of liquid chlorine to the million gallons. For the ordinary settled sewage coming from the primary tanks, I assume it would take some 50 pounds of liquid chlorine to a million gallons. For the filtered and settled sewage I have assumed that about 10 pounds per million gallons would be sufficient.

As to what sterilization will accomplish in point of removal of disease germs, I should say that the removal would amount to 95 to 99 per cent, depending upon the success with which the applied quantity of liquid chlorine was adjusted to

the particular organic content of the liquids flowing, and recognizing the variation in such flow, and in their strength from time to time.

In the matter of pumping stations, these projects for the
1440 treatment of the sewage would involve the operation of the present pumping stations for sewage flows at 39th street, Lawrence avenue, 95th street and elsewhere. They would also require some intermediate pumping along the line of the interceptors, at settling basins and at each of the respective filter plants it would be necessary to lift all the flow, in order to produce a head sufficient to distribute the sewage to these various sprinklers scattered over the surface of the filter bed. There would have to be a head at the nozzle of some six to eight feet, as well as to lift the sewage up to the elevation of the nozzle itself.

In regard to the question of odors and nuisances, I have already spoken of the great importance of preventing such conditions as have arisen at Columbus and Baltimore, where the sewage has become highly putrefactive before it reached the treatment works. That would be accomplished by the aeration that I have described.

In regard to the sprinkling filter sites, I have outlined certain locations which have been used as the basis of these studies. It is not necessary to treat them precisely at the areas indicated on this map marked Fuller Exhibit 1, but those approximate areas, however, are convenient and suitable; and in these instances are entirely reliable for the purposes at hand. These different filtering site areas cannot be limited to the immediate ground which would be occupied by the structures. It is found that in these beds there will grow flies and various forms of animal life, and it is necessary for that reason to purchase land which would keep other property owners from living immediately adjacent to the beds.

There is also the item of odor, which is not very serious if the sewage is kept in this fresh condition that I have spoken about with respect to aeration.

For instance at Reading, Pennsylvania, where the sewage is fresh, it is a mountainous town and high velocities obtained in all cases, the odors are rarely if ever noticed more than 300 feet away. Most sprinkling filters, however, are apt to develop an odor, in the case of large plants for a quarter of a mile; occasionally in some plants it is extended much further than this.

In these estimates made in developing this project, allowance is made for the purchase of land one-quarter of a mile in extent around the entire outer periphery or building line of the proposed works.

In regard to the question of odor around the settling basins, I do not believe that there would be anything serious encountered there, nor would the flow of storm water
1441 treated with liquid chlorine be objectionable in the water courses. It is conceivable, however, that lack of care might produce an excessive application that might not be present except for a very short time.

That, I believe, covers in outline the main features of the best methods now available for building treatment works to clarify sewage, to eliminate the stranding of sewage solids, and putrefaction of mud banks, to take the sewage after settlement and where there would not be water available for oxidizing it by dilution, then subjecting it to the oxidization in sprinkling filters and finally in sterilizing all of these flows so as to destroy objectionable bacteria to the extent of say 95 to 99 per cent of those contained in the original sewage.

This residual small percentage, as I have already explained, cannot be reached by sterilization or any other process, on account of some of those germs being located within the interior of tiny little particles of fecal matter, where the chemicals will not have access. These treatment works are the best that can be applied to problems of this kind, as the art of sewage treatment is known today, both in point of theory and practice.

In regard to the pumping stations, I might add a word and say that they are all assumed to be centrifugal pumps, steam driven, and are assumed in the estimates to be strictly in line with the installations of sewage pumping machinery in the district here in Chicago, and in other large cities. The equipment, as I have said, provides for handling the sewage at a number of points along these interceptors, and in pumping all of the sewage going onto the sprinklers.

That approximate figure of population in 1920, has shaped itself in these estimates by virtue of the fact that the population then existing in the city and in the outlying areas within the Sanitary District would roughly equal the diluting capacity of a 10,000 seconds feet flow of lake water down the main channel. It also represents the best judgment of those familiar with the details, according to my information, of the past growth and the increments in growth leading to proper and reasonable conclusions as to what the 1920 population may be.

My own purpose was largely in getting at a figure as to scope of project which would allow a comparison to be made of the treatment works for a 3,000,000 population which has come into this project, and my reflections in connection
1442 with the 10,000 seconds feet flow, when treating the population at the legal minimum dilution ratio of 3.33 seconds feet per thousand.

I have estimated that it would cost for construction purposes to build Project A, $71,365,866. The annual operating expense and depreciation I estimated at $5,116,057. I have capitalized this annual charge for operation, maintenance and depreciation at 4.25 per cent, and have added it to the investment cost. This makes a sum of $191,742,866. That is the sum which it would cost this district to take care of the sewage by Project A, for the population estimated to exist in 1920, roughly 3,000,000 of people.

For Project B, the investment cost I place at $131,229,707. The annual cost of operation, maintenance and depreciation,

I place at $4,524,952. Capitalizing the latter sum at 4.25 per cent, and adding it to the investment cost, there is obtained $226,970,647, as representing the cost to the district of treatment works for 3,000,000 people by Project B.

Under Project A, to provide treatment works corresponding to a population which would be taken care of by a lake
1443 flow of 12,000 seconds feet, the investment cost would be $85,000,000. The annual operating maintenance and depreciation cost would be $6,102,000. Capitalizing the annual cost and adding it to the investment, there would be obtained $230,000,000. The corresponding figures for treatment works of a capacity equal to that which would be taken care of by 14,000 seconds feet flow of lake water would mean, by Project A, an investment cost of $100,000,000, an annual operation, maintenance and depreciation item of $7,260,000. The sum of the investment and capitalized operating expense would be $268,000,000.

I should state that these figures which I am reading are round figures, obtained with a slide rule. They are not figured to individual dollars and cents.

By Project B, the investment cost of treatment works, with separate sewers to provide for a population equal to that which would be taken care of by 12,000 seconds feet flow of lake water would be $157,000,000. The annual cost would be $5,40,0000. Capitalizing the operating expense and adding it to investment, the total cost becomes $270,000,000.

The corresponding figures by Project B, for treatment works equivalent in population served to that for 14,000 seconds feet flow of lake water becomes for investment cost $183,000,000; the annual cost would be $6,300,000. The sum of the investment plus capitalized annual charges would become $316,000,000.

I should perhaps state with regard to Project B, one or two points that I think I briefly touched upon in my preceding answer; and that is this Project B deals with no storm water sewage at all, no street wash, but assumes a complete

new system of sanitary sewers which would deliver to settling basins the sanitary wastes of the community. That settled sewage would pass through interceptors with areating arrangements onto sprinkling filters, all in substantially the same way as in connection with Project A. The intercepting sewers, however, would be of about half size. The pumping stations would be somewhat smaller. There would be no
1444 sterilization of storm flows; it would go directly into the river without treatment through the existing sewers. The settled sewage, filtered sewage, would be sterilized.

I should say that eight years would be a fair estimate for the period of active construction. I have placed the time at ten years, assuming that conditions would be favorable in all respects with regard to securing funds with which to build these works, and to get the necessary legislation, enabling acts, and condemnations of lands and rights of way.

I could point out for instance that at Providence it was determined in 1887, to build chemical precipitation works, but they were not put in service until 1901. That period
1445 in the interim was required for financing and building the necessary intercepting sewers and treatment works and in adjusting delivery of sewage to those new structures.

In Boston, the original main drainage works were recommended in 1875 for collecting the sewage of the old city of Boston and delivering it to Moon Island for discharge on the outgoing tide. Those works went into service in about 1884.

The Washington works for intercepting the sewage of Washington City and pumping it after some screening into the Potomac River below Washington were recommended by the Commission appointed by President Harrison in 1889. Those recommendations by the Commission were made in the early part of 1890. I think it was 1908 before those works were completed and put in service.

In the Passaic Valley Project, in New Jersey, opposite New York City, the first recommendations there were made in 1897. The matter was reviewed by a State Sewage Commission again in 1901. There was an enabling act passed in 1903. It was in litigation in point of constitutionality until 1907, and the project in its present form was outlined by Hering & Fuller, in 1908, and the construction work was started in 1912, about a year ago, and it is still subject to injunction suits and various vicissitudes of litigation, and including an injunction suit brought in the United States Supreme Court by the State of New York with respect to discharging this sewage into the upper New York Bay.

The Charles River Dam project in Boston was active in my days there in 1891. That relates to building a dam across the Charles River near the old Cragie bridge, and preventing the exposure of the tidal flats on the Boston and Cambridge sides of the river, and in building intercepting sewers along the water front on each side to send the sewage down to points beyond or outside of Boston Harbor.

Those works were the subject of many legislative investigations, particularly a very exhaustive one made by Mr. John R. Freeman in 1903. The works have been in service I should say about three or four years, so that I think experience very abundantly shows that actual periods required for getting legislation and in getting financial programs adjusted, getting works that will not be made the subject of too many legislative inquiries and investigations by Citizens' Committees, I think all of those things taken into account make the period very much longer than the actual designing and construction calls for.

I doubt whether any of them exceeds $15,000,000 in in-
1446 vestment as compared with $70,000,000 here for Project A, and $130,000,000 for Project B.

Project A would involve tearing up streets along the lines shown here in red ink on this map marked Fuller Exhibit 1. It would cover a good many miles of streets in the

vicinity of the water courses of the north branch, the
1447 main Chicago River from 39th street over beyond the Stock Yards district, to a point where 39th street meets the Drainage Canal; also down through the Calumet District as shown in this plan.

In Project B, there would be involved the tearing up of every street throughout the district, in order to build the sanitary sewers in it to parallel the existing sewers. It would not only mean tearing up every street that is now paved, but it would also mean lateral house branches from the street sewer out to the curb line under the sidewalk to the property to the building line.

It would encounter, of course, a good many underground obstructions, in the nature of interference by existing utilities, water mains, gas mains, electric light conduits and telephone conduits, etc.; also make a decided impression on street pavements; involve considerable care in maintaining trolley lines in service during construction periods.

(Mr. Fuller corroborated the testimony of Mr. Wisner as to the conditions at Chicago and with reference to the effect of the Sanitary District diversion works.)

Asa E. Phillips, a witness for the defendant, (Rec. Vol. III, pp. 1516-1533; December 12, 1913):

Resides at Washington, D. C.; civil engineer; graduated from civil engineering, Lehigh University, 1893; had charge of the preparation of the plans for construction and operation of the sewage disposal system of the District of Columbia, covering a period of more than fourteen years; for the last seven years superintendent of the sewer department of the District of Columbia; made special studies of modern development of sewage treatment; connected in an advisory way with the Passaic Valley work.

The witness further testified:

City of Washington uses the dilution method; sewage is collected at certain points, then pumped from the low level to a higher level sewer by means of which it is discharged into the Potomac River mid channel below the city. The Washington city sewage disposal was planned and recommended by commission of engineers appointed by President Harrison in 1889, consisting of Messrs. Rudolph Hering, Frederic P. Stearns and Samuel M. Gray. Total cost of the work was $5,000,000. They were not completed until 1907. A modern filter plant has been installed for the water supply.

In a broad sense, artificial sewage treatment plants are not used. In something like eighteen cities having a population of over 300,000 people, the disposal of sewage is entirely by dilution, with the one exception of Baltimore, which has recently completed a plant but has only partly operated same to date. In fourteen cities having a population of over 150,000 and less than 300,000, there are treatment works at Providence, Rhode Island, Columbus, Ohio, and Worcester, Massachusetts. The purpose of these treatment plants is generally to prevent a nuisance in streams into which they discharge. One of the older works of Providence, Rhode Island, was put in with a view of preventing the oyster beds in the Providence River below the point of discharge from being polluted. The same is true as to the works at Baltimore.

Looked at from the point of view of practical results up to date, none of these works have accomplished what would reasonably be supposed to be their complete function. In every case, they discharge either an effluent that does not have a degree of purification such as to prevent the streams from actual and dangerous pollution, or they operate intermittently, and intermittently throw a load of sewage directly into the streams, or discharge the sludge from the treatment works at times into the streams.

In the comparison between what is accomplished at these works and what is accomplished at other works using the method of dilution where reasonably uniform and con-
1522 stant results are obtained, practically unchangeable except due to the variation of season and of temperature, these artificial treatment works have not been successful. Some qualification ought to be made as to this, in the case of the new works at Baltimore which, while completely constructed, handle only a very small portion of the sewage, and with regard to these works they have developed just as the works at Providence developed, very serious local nuisances, which are involving lawsuits. And at Baltimore, a very great reliance, even by the engineers in planning the works, has been placed in the effectiveness of the purification by dilution, that would be accomplished in the travel through the arm of the Bay in which they discharge.

In the case of the other works, having only in view the prevention of the gross pollution of small streams, such as the new works at Atlanta, there is no very serious problem such as the protection of the water supply, involved.

The works at Providence, chemical precipitation works, designed to protect the oyster beds from pollution, have been substantially abandoned, and the works there today, with the exception of some sedimentation and some attempt to disinfect the sewage, are substantially, pure and simple, works of dilution.

The abandonment of older processes, though comparatively new themselves, and the fact that the present appliances that have been introduced in the design of artificial treatment works are extraordinarily new, and might fairly be considered experimental, it is a reasonable conclusion that with the changes that have been going on in a short space of a little more than fifteen years, and most of it in the space of a little more than five years, possibly within ten years, there will be new lines in the treatment of sewage, and new processes that will revolutionize as completely the methods of today as

those methods were revolutionized only a very few years ago.

1523 The very first consideration in weighing various possible plans in any case would be the protection of the water supply. The absolute necessity of this exists where a water supply is in reasonable proximity to the works. That is in the discharge, for example, of the effluent of artificial works or of sewage for dilution within a certain range of distance subjects the water supply to pollution and to serious injury. At greater distances, further removed, of course, that becomes less important. In any case, the method should be such and the design of the works such as to absolutely prevent at any time the pollution of the water supply if that is within the range of possibility; that is even the contingency of pollution should be prevented.

It involves both the raw sewage and the effluent because there is no, absolutely no certainty that with the most modern works, most carefully devised and designed, that there will not be periods when raw sewage may be discharged.

And then, on the other hand, is the question of the efficiency of the works themselves in obtaining, if it is possible to obtain such a thing, an effluent that is entirely, at all times, free from dangerous pollution.

I give great weight to the danger which may result from the operation, that is, the inefficient operation of these plants, disposal plants, or the efficient operation of filter plants to filter water supply, owing to the absolute uncertainty of continuous, efficient operation in both cases.

The greatest difficulty is involved in the impracticability of handling the sewage otherwise than on a system of units, owing to the enormous volume of sewage, to the great areas covered, and the long period of time involved for the transit of the sewage to the treatment works. It involves the necessity of the construction of such works substantially within the city close to dwellings; that is in fairly close proximity to dwellings; and all experience on the treatment of sewage

today, so far as the location of treatment works is concerned, is in favor of their remote removal.

Baltimore, for example, one of the newest, and the larg-
1524 est city in America to put in treatment works, located the works something like seven or eight miles from the city, selecting a location remote from any dwellings. In addition to that, they felt compelled to buy large tracts of ground to create a neutral zone around their works, and yet, with a very short period of operation, and very low load on their works, only having part of the sewage to handle, they have been confronted with damage suits for the creation of a nuisance, by the owners of property along their holdings. The certainty in a very large community of the sewage reaching the works stale, its creating local nuisances along the line of travel in the interceptors, even with the entire area broken up into districts, is a great problem and a source of danger in a very large community.

The difficulty of handling the resulting materials accumulated, the sludge particularly, from the treatment works, its removal, its necessary storage in preparation for its removal, appears to me to be a most serious problem in considering any treatment works for very large communities.

In the years 1910, 1911 and 1912, the death rate from typhoid in Washington was 24, 22 and 22, respectively; per 100,000 population.

LYMAN E. COOLEY, witness for the defendant, whose qualifications have heretofore been stated (This narrative, p. 138; Rec. Vol. III, p. 1705), testified as follows:

The State Board of Health undertook to cooperate in the investigations that we were making at Chicago between 1885 and the passage of the Sanitary District Act in 1889, and
1706 made a very comprehensive series of analyses of samples through one summer and one winter, taken at various points between Lake Michigan and the City of St. Louis, in or-

der to determine the question of the self-purification of sewage introduced by the Illinois & Michigan Canal from the City of Chicago.

I made a study of the possibility of utilizing this great natural reservoir in passing waters by way of the Des Plaines and Illinois Rivers to the Mississippi River; and gave the matter general consideration at that time.

Later, I took up the matter as part of my duty as chief assistant to the Drainage and Water Supply Commission in 1886 and 1887. I followed the matter up, prepared a paper upon the subject matter in 1888, and brought the whole subject matter into final form in a series of papers before the Western Society of Engineers in 1888; printed early in 1889.

I later gave it further consideration, while a member of the International Waterways Commission. The instructions of Congress to that Commission were that we consider in full the water supply in connection with the development of ocean navigation into the lakes from the Atlantic Seaboard.

I have had occasion to make a study and examination of
1707 the necessities of the navigation interests and the improvement of navigation at Chicago and through the Illinois and Des Plaines Rivers.

That proposition was in view from the inception of the drainage enterprise, and in fact you might say from the time that the Chicago divide was discovered, in 1673; and it was a part of the policy of this State from the beginning to procure the construction of a waterway through the State. And when the Chicago sanitary question came up, and it was determined that the solution would require a large canal across the Chicago divide, the State, through its General Assembly, took the view that it should be constructed so as to lend itself to the development of a deep waterway through the State. And so from the beginning, the effect of this water which was needed for the sanitation of Chicago upon the regimen of the Illinois River and of the Mississippi River; and how it could be utilized in producing a waterway, was a prominent

factor and an important factor also in determining the policy of the State in granting the privilege to the City of Chicago of sewage disposal in the manner proposed.

I am familiar with the history of the State prior to the time when this matter was taken up. I acted as consulting engineer to a special joint committee of the General Assembly, which framed the Sanitary District law and was familiar with
1708 all the considerations that influenced that law, in Chicago and in the valley.

I was at Springfield during the entire consideration of the matter, and had general charge in the latter part of the session of the bill for the City of Chicago, for the City Council of Chicago and for the several civic organizations of Chicago, and I believe that I know as much about what the policy of the State was at that time, as anybody can know.

I drew some supplemental measures known as the Little Waterway Bill and the joint resolutions of 1889 and also of 1897, which were passed by the General Assembly, declaring the policy of the State.

I had at that time been over all the documentary evidence in relation to the subject matter, reports of various kinds, going back to that of Major Long in 1816; Phillips and Graham, in 1819, and to the report of General Gratiot, in 1834, in which the United States proposed at that time to construct a channel 10 feet deep and 100 feet wide; the land grant to the State of Illinois to aid in the construction of the Illinois and Michigan Canal; the report of the survey and examinations of John B. Preston, 1857 and '58.

John B. Preston, was a civil engineer in the State of Illinois, who made a project for steamboat navigation between Lake Michigan and the Mississippi River, in which the low water navigation of the Illinois River was to be made by aid of a water supply from Lake Michigan.

That proposition was followed up by joint resolution of the General Assembly in 1861, which called upon the canal trustees to examine the subject matter.

In 1862, there was a bill in Congress providing for such a waterway. The Honorable Thad Stevens made a speech, in which he denounced the proposition as a measure to drain Lake Michigan and convert it into a cornfield. So the objection on this lake diversion proposition goes back a long ways.

1866, General Wilson was charged with the duty of making a survey, and based his report of 1866 and '67 on the notes and data collected by John B. Preston in 1857-'58.

In 1867, General Wilson by the aid of a special appropriation from Congress made a survey of his own, which was
1709 reported upon in December of that year, and there was also a report on the Upper Illinois River by Colonel McComb, 1874 and by Major Benyaurd in 1883, and also upon the enlargement of the Illinois & Michigan Canal in connection with the Hennepin Canal in 1882-4, and by the Comstock Board in 1886 and '87.

All these documents gave a very complete idea of the physical conditions of the Illinois River and its possibilities of development, and were available prior to the passage of the Sanitary District Act.

Howard Stansbury, United States Engineer, made an examination of the Illinois River in 1838, and General Joe Johnson, later of Confederate fame, was upon the river engaged in improving the same in 1852 and '54. We had all that material.

I was the first chief engineer from January 1890 to December of that year; and a year later, December, 1891, I became a trustee of the Sanitary District and the chairman of its engineering committee until the close of my term in 1895.

1710 The Chicago River basin, as it originally existed in nature, consisted of the North Branch and its drainage basin, together with the South Branch, an area of about 240 square miles (now about 300 square miles). West of the Chicago River basin, was the Des Plaines River basin, drained by the

Des Plaines River which ran parallel to the lake from the headwaters in Wisconsin down to a point about ten miles from Lake Michigan at Lyons; and then leading southwesterly to a junction with the Illinois River, or to the junction with the Kankakee River, which formed the Illinois.

This Des Plaines River, in the vicinity of Lyons, had a low water elevation of about eight feet, and a drainage area of 633 square miles.

The divide between the Des Plaines River and the Chicago River was in the vicinity of the Bridewell, just west of Kedzie avenue, and had an original elevation of about 10½ feet above Lake Michigan, and whenever the Des Plaines River rose from two or three feet above low water, or exceeded a volume of about 1,000 second feet, the flow of the river divided, part of it coming through the South Branch of the Chicago River to Lake Michigan, and in great floods 60 to 70 per cent of the entire flow of the Des Plaines River came to Chicago.

This condition existed up to about 1854, after the Illinois and Michigan Canal had been opened in 1848, when the Drainage Commissioners cut out the original divide at Kedzie avenue and drained out the Mud Lake region as it was known in Voyageur's days, and on the original land maps as "Portage Lake, Portage Swamp, and Portage Slough."

For a number of years thereafter, the entire flow of the Des Plaines River came in the direction of Chicago except at such times as in the fall and winter when the ice interests of the Des Plaines River Valley made a temporary dam in order to fill the ponds on the 12-mile level between Summit and Lemont, for ice-making purposes.

Finally the flow from this source became such a nuisance to the City of Chicago that after 1870 they constructed the Ogden-Wentworth Dam. That crossed the old Portage Slough at the range line at Summit, at an elevation of something over 11 feet above Chicago datum. And this was overflowed also, whenever the river rose above a volume of about

1,000 feet per second; and the waters continued to come this way in flood times when the volume exceeded that amount until 1893, when the Sanitary District executed its river diversion and created a spill-way above Summit, which restricted the flow down the river until the volume reached between 3,000 and 4,000 feet per second. And in about 1909, 1711 this was finally closed, so that no waters from that source have come through the Chicago River to Lake Michigan since.

The effects of this overflow have been most pronounced and is noted from time to time in the narratives relating to Chicago and its portage. For a portion of each year boats in the fur trade made the trip from the Chicago River to the Des Plaines River and down the Illinois to the Mississippi River without any portage at all. For a portion of each year, a portage of two miles was required; for another portion seven miles, and in very dry seasons the portage was 51 miles to the junction of the Des Plaines and Kankakee Rivers at Dresden. Those conditions were availed of in trade and travel, from the time of the Discovery down to the time of the removal of the Indians from the State of Illinois in 1836.

The first white settler of Chicago, or the first white man to domicile here was Marquette, in 1674-5, and he was driven from his cabin on the West Fork of the South Branch near Robey street by a flood that came over the divide; and the next day he resumed his journey down the Des Plaines and Illinois Rivers without making a portage.

In 1832, the United States made an appropriation for opening the mouth of the Chicago River, and projected two piers from the vicinity of the present site of Rush street bridge, across the sand spit into the lake; and made a single dredge cut across the bar. This bar was washed out in 1834 by one of these floods that came across the divide.

A schooner entered the port of Chicago for the first time after this flood.

In 1849, a great flood came over the divide and cleaned out all the bridges in the Chicago River, wrecked all the shipping, producing a great disaster for its day.

The same thing was repeated in 1858.

In 1881, the water came over the divide for probably six weeks or eight weeks continuously, in large volumes.

In 1887, I measured a flow coming across the Chicago Divide of 7,000 feet per second, the flood of that year.

In 1892, this flood condition was very critically examined from the Chicago River to Lake Joliet, and a steamboat drawing three feet of water could at that time have gone from
1712 the Chicago River down to the Illinois River, and returned, in the absence of bridges. Aside from these conditions respecting the flood waters, the site of Chicago itself was substantially a morass, similar to what exists adjacent to the Calumet River up to a recent time, and still exists in some sections, awash in high waters of Lake Michigan, and overflowed in all these flood times. It was of much less extent than the Calumet marsh region; and along the lake shore there were the remnants of a sand spit, and wind blown sands rising from 10 to 20 feet above the lake; but generally behind that and out to the slopes beyond, the low lands bordering the Chicago River, the banks were only three to five feet high at low water, and consisted of ooze and muck and alluvial clay, interstratified with layers of sand.

The City of Chicago, or Village of Chicago was organized on August 10, 1833, 28 electors voting; population estimated at 350, from which I presume that none except those that were running for office voted.

At that time it was a mere frontier camp, and the usual well 6 to 12 feet deep in the front yard; slops thrown in the back yard; a privy vault on the back end of the lot. The soil conditions very soon made this intolerable, and the floods occurring annually diffused the deposits on these lots, without regard to sanitary discrimination.

As early as 1836, the conditions had so developed that the people were taking their water in pails from the 1713 river and from the Lake Shore; and the first water system of the City of Chicago consisted of barrels mounted on two wheel carts, that were backed down into the lake and peddled on routes, much like the milk routes today.

As early as 1836, a franchise was granted for a water company to supply the citizens with water, but owing to the panic of 1837 and the financial stress of that period, this company did not get its works installed until 1840; and these works consisted of a 250 barrel tank mounted on blocks at the foot of Lake street, with a 25 horse power engine, a short pipe intake into Lake Michigan and two miles of log pipe, bored out by hand; laid in the streets as a distribution system.

The people of even that day were adverse to monopolies, and did not patronize this water company to the extent of making it a financial success; still preferring the institution of a barrel on two wheels. So in 1851, a charter was granted to a water company, a new water company. The city had been organized in 1837 with a population of about 4,400 to 5,000 in 1840. In 1851, the population had reached about 35,000 and a new water company had been chartered; but the city finally took over the whole proposition in 1854 and established the works at the present site at Chicago avenue on the North Side.

There was some discussion at that time in regard to whether the site should be on the north side of the river or the south side of the river, but the general opinion prevailed that there was a lake current tending southerly along this shore, and it would be safer from pollution to put it on the North Side.

There was another event happening about this time, the opening of the Illinois and Michigan Canal in 1848. The first shovel had been thrown on this Canal at Bridgeport within the present city limits July 4, 1836; and that had contributed greatly to the growth of Chicago during its construction.

The first railroad out of Chicago was opened out to Elgin, also in 1848. The Michigan Southern Road came to Chicago in 1852.

There was a sickly period in Chicago between 1849 and 1854, in which the death rate rose to 48 to 50 in a thousand; three times what is now normal to well sanitated cities.

All these events, what was happening to the water supply, the death rate which had grown so enormously, the feeling that Chicago had ceased to become a mere camp and had
1714 a future before it, led the citizens to make an extraordinary effort to better the conditions here, in order that she might realize destiny. And so in 1855, or 1854, Mr. E. S. Chesbrough, of Boston, was employed as the Sanitary Engineer of the city; particularly at that time to devise a sewer system. Mr. Chesbrough went abroad and studied the conditions at Hamburg and at London and other foreign cities in 1856-7, but had submitted plans for his sewer system late in 1855.

In that connection I desire to say that this was the first comprehensive sewer system in the United States, and that we had at that time about 75,000 to 80,000 of population; and that other cities in the United States like New Orleans have only had a sewer system within the last ten years. Baltimore has not yet completed a sewer system.

I will say further that it was the second comprehensive sewer system built in the world. Hamburg had built a sewer system after its great fire, about 12 or 14 years before. London had started a sewer system, but its plans were not yet complete, and were not completed for three or four years later for a comprehensive system.

The state of the art up to that time had been that all human wastes were excluded from sewers by law. That was the law in England. And it was not until the report of the cities and towns commission in 1844 in England that that law was changed. At that time there had received general acceptance the filth theory of disease, and England and the Continent went on a general clean-up, you might say.

Berlin did not have a sewer system until 1860. All human wastes were excluded from the sewers of Paris up to 1880, so Chicago was a generation or so ahead of the world, and led the United States in regard to its sanitary provision in 1855.

Mr. Chesbrough planned his sewers so as to give a seven foot basement under the buildings, and as a result the grades of Chicago were established at 10 to 12 feet above city datum.

Street grades; and in many places the sewers were built on mounds entirely above the level of the ground, the natural ground, or on embankments; and walls were built on the curb line; and that is the reason for the general conditions that you notice in Chicago, that the basements all go out to the curb line so as to save the filling required to cover the sewers; and the sidewalk space beneath, which does not exist to the same extent in any other city.

1715 After the Great Fire, the grade was again re-established to the present level of 14 feet above the city datum. I was here in 1872, after the Great Fire in 1871, and remember distinctly the condition, that the sidewalk of the city was going up and down at every street crossing, on account of the new grades.

The sewer system then planned by Mr. Chesbrough discharged for the most part to the river. No sewers entered the lake on the north side, on account of the water supply. And the early main sewers came to the main river, so as to be within the influence of any circulation that might be established by way of the Illinois and Michigan Canal. The only sewers that were planned toward the lake was the one east of State street on 12th street and at 22nd street; and later when the city was extended down to 39th street, the 35th street sewer was added, also discharging into the lake. These plans were followed out substantially with the raising of the general grade of the city; and the conditions on the unimproved low lands continued as observed by me in 1872 and 1874 to 1878. Meantime the condition in the river itself was becoming intolerable.

On account of the great cost of raising the city to the grades required to produce a sewer system, the trunk sewers were laid on extremely low grades, 2½ to 4 feet per mile, which constituted them sewers of deposit in low water, under conditions of dry weather flow. And it was recognized from the beginning that catch basins and sewers would have to be cleansed from time to time, and it was only in storm time when the sewers were running substantially full that the sewers were self scouring, that is the trunk sewers.

The conditions in the river early became intolerable with the growing population. We had reached 125,000 by 1860. Chicago early became a packing center, and winter slaughtering was practiced at that time, before they had the refrigerator methods which permitted of all the year around slaughtering. And there had not been introduced at that time the saving in the by-products, bloods and other matter (this has since become a feature of Chicago slaughtering institutions), and everything went to the river, and so the river, particularly in winter time, became very bad.

Under some arrangement, the pumps were operated during the later fifties in the interest of a better river.

1716 The Illinois and Michigan Canal, as it was finally completed under the canal trustees, had a summit level of 8 feet above Lake Michigan, and it was fed in ordinary seasons from the Des Plaines River and by a feeder through the Sag Valley and the Calumet River at Blue Island.

That was known as the Shallow Cut Plan.

A dam was built across the Calumet River at an elevation of 11 feet above Chicago datum. This was insufficient in the dry seasons, and a Dutch Wheel or Lift Wheel was erected at Bridgeport, at the forks of the Chicago River and at the head of the canal for the purpose of supplementing the feed water of the canal, and in such seasons that was sufficient in cleansing the Chicago River and these were operated for that purpose in the later fifties.

But in 1863, after Chicago had established a Board of Public Works, the Chicago River became very offensive. An erysipelas epidemic occurred, which was co-terminus with the South Branch and was attributed to the blood and other matters from the slaughtering houses, and it was depicted on the spot maps as the "Valley of Death."

The Board of Public Works at that time made an arrangement with the Canal Trustees by which the Bridgeport Pumping Station should be operated and the city would contribute to the cost of doing so for the purpose of cleasing the Chicago River; and that arrangement continued up to the time that the canal deepening was completed in July, 1871.

Meantime the effluent from the river was contaminating the water supply, and Mr. Chesbrough projected the first lake tunnel in 1862. It was authorized in 1863. It was to be five feet in diameter, and extended out to the crib two miles from shore, and it was thought that this would give immunity for a long time in the future. It was believed that the effluent from the river for the most part would stay near the shore line, and would not reach out that distance into the lake.

Nevertheless, in designing that tunnel, he made his plans in such a manner as to invite an extension in the future without disturbing the existing conditions, providing an
1717 extension out from the crib in a separate shaft, so it could be shut off and extended at a future time.

This work was severely criticized by all the wise men of Chicago at that time, and Mr. Chesbrough's life was made a burden to him, but in 1867 it was opened, and attracted the attention of the world and made the reputation of Mr. Chesbrough as an international engineer. It has since been followed in all lake cities and followed in all water works practice, to the extent that tunnels can be made available.

He immediately followed this tunnel with a seven foot tunnel parallel to the five foot tunnel, leading from the same crib by way of the Chicago Avenue Station southwesterly across

the city some four miles from Chicago avenue to 22nd street and Ashland avenue. That station was opened in 1874.

The Chicago River at this time was in a deplorable condition. I was in Chicago nearly every day, or several times a week, from 1874 to 1878, and made a study of the conditions here, and was personally very well acquainted with Mr. Chesbrough. The North Branch, as I used to ride by it, between Evanston and the city, in the heated term of summer, exhaled an effluvia that compelled the passengers on the Northwestern Road to shut down the windows in order to keep themselves from being nauseated. No words can describe the potency of that smell.

This condition led Mr. Chesbrough to project the Fullerton Avenue Conduit, started in 1874 for the purpose of circulating the waters of the North Branch. It was put in operation in 1878, and as operated it changed the waters of the North Branch about once in three days, which greatly mitigated the badness of the smell. But it was still far from a satisfactory exhibit.

The South Fork conditions were even more serious than the North Branch; the smell from that source reaching out to the lake shore in the then best part of the city, down in the vicinity of the Douglas monument and above. This was noticed particularly in the night time and on foggy days. The sun seems to have some resolving powers in dissipating these smells.

Mr. Chesbrough projected a similar conduit to the South Fork, but his enterprise in behalf of the welfare of the city by that time had reached such a magnitude that he was unable to carry out that enterprise, and we retained the
1718 conditions of the South Fork with us until the Sanitary District finally changed the same along about 1908, I think.

Meantime, a Commission had proposed the deepening of the Illinois and Michigan Canal on the original plan; and in 1865 an enabling act was procured from the General Assembly

which authorized the City of Chicago to deepen this canal on the original plan for sanitary purposes; and the city of Chicago did so, and expended thereon about Three Millions in cash and opened the same in July, 1871.

That was gravity flow.

The General Assembly was called in special session after the Great Fire of October, 1871, and repaid this money to the city of Chicago, and it was all the funds that it had until the city was in shape to again realize taxation.

This canal as originally projected and worked on from 1836 to 1841, when the state went broke, had a declivity of a tenth of a foot per mile or 2.9 feet between Bridgeport and Lockport. But when work was resumed under the trustees for the bondholders in 1843, they adopted the expedient of a temporary level 8 feet above Chicago datum for 26½ miles, which I have already described.

The original divide at Kedzie avenue was about 10½ feet above Chicago datum called the "Continental Divide."

But this was a mere alluvial deposit. The real divide was the rock floor at Lemont which was between 7and 8 feet above Chicago datum, and about 2 or 3 feet above the high water of 1838, which was the highest water on record. The original divide was only 5 to 6 feet above high water of 1838.

This was the only relief that the city had until the canal was reinforced by pumping works in 1883. The canal when opened to gravity is estimated to have carried out 40,000 cubic feet of water per minute. But the lake was then high, and in later years as the lake fell, the capacity shrunk to 15,000 or 20,000 feet per minute, which was scarcely more than the dry weather flow and the water supply of the city, so it was ineffective in preventing the sewage from flowing towards the lake. And the condition of the canal became so bad that at the instance of the State Board of Health, first in 1878, when it was organized, I think, in 1877, the Munn 1719 Resolution was passed by the Legislature in 1881, calling upon the City of Chicago to erect pumping works there of a capacity of not less than 60,000 feet per minute.

These pumping works were installed in 1883, but were not actually accepted from the contractors and taken over by the city until 1886, although they were operated meantime.

These pumping works were authorized by the Legislature in response to the representations of the State Board of Health, which had taken a position supported by the report of Superintendent Thomas that the canal could be made to carry 100,000 cubic feet of water per minute, and that such a volume of water would dilute the sewage substantially beyond offense. But they did not get the recommendations carried out except with the minimum limit of 60,000 cubic feet. It was for the purpose of relieving the nuisance at Joliet, and in the Valley further down; and also for the purpose of purifying the Chicago River that these pumps were installed, or called for by the Legislature.

Mr. Chesbrough was uncertain in his own mind in 1878 as to what the future solution of the sanitary question was to be. He had planned along the line of the State Policy, which had contemplated from the beginning the flow of water in the direction of the Illinois Valley, and which comes up from time to time in all the actions of the state. But the city was unable to finance a proposition of that kind. Conventions had been had, reports had been made; there was a
1720 Great Waterway Convention in 1847 and again one in 1863, in which 14 states were represented, urging this project; the Board of Public Works had considered it in 1860, so the matter was a familiar one to the people of Chicago, the idea that eventually sewage disposal was to be down the Des Plaines and Illinois Valley.

The only incident that occurred of particular moment between 1878 and 1885, was the Great Flood in the Des Plaines River. This flood reached a magnitude of 13,000 second feet; continued at a uniform elevation for about four days; gradually shrunk, but exceeded 10,000 feet per second for 21 days, at Riverside. There was probably from 5,000 to 8,000 cubic feet per second coming across the Chicago Divide during that time; and a lesser amount probably for two or three times as

long a period. In addition there was probably a maximum flood from the Chicago basin of not less than seven to 8,000 feet. These conditions swept the Chicago River clean and led the people of Chicago to renewed earnestness in the consideration of their sanitary problems. Between that time and 1885 various projects were mooted, one of which was to shift the water supply to Grosse Point, the north limits of the City of Evanston; another to shift it to Highland Park in Lake County, and let the water come down by gravity. Another was a deep cut proposition which was worked up by Mr. Matthiesen at Joliet, by which a narrow and deep channel with high velocity was to be constructed from the Chicago River and located between the Illinois and Michigan Canal to the Des Plaines River; and discharging in the upper basin at Joliet.

The Citizens' Association of Chicago had taken particular charge of this matter and had worked up this latter proposition of Mr. Matthiesen's and made a report thereon.

1721 On August 2, 1885, occurred a rainfall of over 6 inches in 24 hours, the greatest precipitation that has occurred during Chicago rainfall record, beginning in 1843. The effect of this rainfall was to sweep out the contents of the Chicago River; to scour out all the sewers and catch basins and to wash the streets. The entire effluent went into the lake and filled the lake with a black filthy mass extending several miles north and south along the shore, and out beyond the crib. And its effect was visible in the water supply for a long time afterwards.

The Standing Committee of the Citizens' Association appointed a sub-committee consisting of Mr. Ossian Guthrie, who had operated the Bridgeport Pumping Station, since its installation in 1848 up to the time it was abandoned in 1871 by the deepening of the canal. He had ice interests in the Des Plaines River, and was thoroughly familiar with all the flood conditions at Chicago. They selected also Doctor Frank Reiley, who was then the Assistant Secretary of the State Board of Health of Illinois, and they selected me as engineer.

We made a general examination of the situation, visited the Des Plaines River and all the points of interest in connection with the phenomena, and wrote a report which I drew; and this report substantially unchanged was adopted by the General Committee of the Citizens' Association, and printed in all the Chicago papers on August 27, 1885. A rainfall not quite so large occurring a week or two later, also producing a large flood, came in to re-enforce the findings of the report and give them general credence and acceptance among the people.

This report contemplated or recommended that all storm waters including all sewage be permannently excluded from Lake Michigan; that a channel large enough to accomplish this be built through the Des Plaines Valley to an outlet near Joliet; and that in order that this channel should not be unnecessarily large, the headwaters of the Des Plaines and North Branch should be diverted to Lake Michigan. Of course it involved taking out all the sewers and reversing them, or intercepting those that emptied into the lake; and also providing a circulation in those parts of the river which had no circulation; parts of the harbor.

This proposition was followed by an ordinance of the Council which I drew, and which was promptly vetoed by Carter Harrison, Senior, on the ground that the city had no means of financing the undertaking; and it was vicious to discuss these propositions, and unpatriotic under those circum-
1722 stances.

Later Mr. Harvey B. Hurd, went to Mr. Harrison and pointed out to him a constitutional method of raising money through the creation of a blanket corporation, such as we have precedent for in the Park Boards, with its own power of taxation and bonding. Mr. Harrison later sent a message to the Council recommending the appointment of an expert Commission, and this was adopted.

In April, 1886, Mr. Rudolph Hering of Philadelphia was selected as Chairman of the Commission, and later Mr. Samuel

B. Artingstall, who had been assistant engineer to Mr. Chesbrough and was then city engineer, was made a member; and also Mr. Benezette Williams, who had been an assistant engineer to Mr. Chesbrough, and who had recently completed the Disposal Works at Pullman, which were looked upon as model works at that time, and an augury of the future disposal of sewage, by scientific and rational methods. I became chief assistant in general charge, in the absence of Mr. Hering, of all the work, and in special charge of those parts of the investigation which we are particuary concerned with in this inquiry.

I had the subject of streams examination through all the water sheds that affected the Chicago condition, the lake currents, lake levels, the ship canal surveys, borings, calculations of the capacity of channel; the Illinois River problems; its effect on the Illinois River of the proposed flow of water from Lake Michigan; the examination of the Chicago River and its contents and of the special filth producing industries; an examination of the conditions of the Illinois and Michigan Canal; an examination of the conditions produced in the Illinois River by the sewage which had been sent down the canal. Mr. Swan of Boston had particular charge of the investigations relating to land disposal, sewage treatment and lake disposal. Mr. Swan was a man who had been connected with the Massachusetts Board of Health, which had made perhaps the most extensive researches up to that time respecting the pollution of streams; and he had also made a number of trips abroad.

1723 I had included in the report of the Sub-Committee to the Drainage Committee of the Citizens' Association a statistical statement to show that Chicago would reach one million inhabitants in the year 1890, and would be able to finance the undertaking. I was asked to strike out that matter as it would discredit the report, as nobody in Chicago believed that this city would reach a million inhabitants in the year 1890. There was no member of the committee who believed it; and so I struck it out, as it had no material bearing upon

the project itself. There were on that Committee such citizens still living as J. J. Glessner and J. Harley Bradley.

1724 I also made a critical examination of the Chicago River and its contents, and dredged up every acre of its bottom within the city to ascertain the nature of the deposits there occasioned by sewage. The Chicago Harbor has an area of about 450 acres, which was actually used for shipping purposes. This river, as I have already stated, was swept clean in August, 1885.

In the Fall of 1886, it had a sludge deposit in the North Branch from a foot and a half to 6 feet in depth; and in the South Branch about 4 feet in depth. This sludge was not what is ordinarily termed sludge in the nomenclature of sewage disposal. It was a black, jelly-like mass full of cavities like Swiss cheese, indicating a secondary decomposition, and emitting gases on its own account; and from all the studies and examinations and knowledge which I could acquire in regard to the same, it appeared to be largely hydro carbon, bacterial gases that are thrown down through the decomposition. I estimated that the South Fork would have filled up in four years from these deposits, except for the progressive decomposition that was going on.

I repeated this examination after the spring flood of 1887, and found that the river had been swept clean of these deposits.

1725 Those went out into the lake.

They were of that constitution, so cellular in composition that when they are once broken up by a propeller or other disturbing forces, they would float readily in the water.

I also made an examination of the Illinois and Michigan Canal to ascertain its condition respecting these sludge deposits and what current must be maintained to keep the same from settling on the bottom. I found practically no deposits similar to those which I have described in the Illinois and Michigan Canal. There were deposits in wide water, which consisted very largely of earthy matters; and it seemed

to be that a velocity of ½ to ¾ of a mile would maintain all these substances in suspension.

I also made an examination of the conditions in the Illinois Valley since the sewage had been down there through the canal, and made an extended trip from Joliet to La Salle, interviewing all the people and fishermen who were familiar with the condition of the river, respecting that subject.

We had a breakup flood in 1887, occurring the latter part of February, which reached 10,000 second feet at Riverside, but was of extremely short duration, as a freezeup set in the next day, after the flood got fairly under way. I measured that flood in the North Branch and in the West Fork of the Chicago River, where I ascertained that 7,000 second feet was coming across the divide. I also had a party at Riverside. Mr. Hering was in personal charge of a party at the mouth of the Chicago River, and as I recall measured 12,000 feet of water going out into the lake in that flood, which was by no means an extraordinary flood.

A preliminary report of the Commission was made January 30, 1887, and in that report they considered three methods of sewage disposal for Chicago.

One of these methods was to gather up the sewage by intercepting sewers and conduits, and pump the same to the sand ridges and dunes of Indiana, east of Hammond, and between the Little Calumet River and Lake Michigan; and there dispose of the sewage on land by broad irrigation and intermittent filteration. This scheme was regarded as impracticable by reason of divers political jurisdiction, and by reason of cost. And it still left problems to be solved in the circulation of rivers and the care of floods. It was known even at that time, and more fully developed later, that the condi-

tions of flood waters and especially the conditions of the
1726 water in the Chicago River when this city was taking a

bath, the sewers were being scoured out and the streets washed, were worse than at any other time. And no such scheme could care for these food conditions; and the condi-

tions for the maintenance of proper sanitary conditions in the river itself.

The second scheme worked out was like the first, so far as gathering up the sewage was concerned, and a conduit was to be driven out into the lake opposite Jackson Park and the sewage there forced out through this conduit and diffused in the lake. The water supply was to be shifted north to Grosse Point at the northern city limits of Evanston. This proposition was estimated, and it was also regarded as prohibitive. It was strongly objected to on the score of possible contamination of the water supply even at that distance, as the lake currents showed that to be possible: and also for sentimental and other reasons. The effect would be to pollute the bottom of the lake here over a very large area to be stirred up in storms and result in a bad condition of the water in this end of Lake Michigan. It also failed, like the first scheme, to take care of flood water conditions, and the circulation of the river.

The third proposition, which was affirmatively recommended, was the ship canal solution, substantially as outlined by the report of the Citizens' Association of August, 1885, and the capacity of the channel which it was then determined it would be necessary to take care of the flood conditions was fixed at not less than 10,000 second feet.

This would also take care of the Chicago River and produce proper circulation in its branches by means of adjuncts. The population estimated in all these schemes was two million and a half people, and on that basis the dilution was inferred at four cubic feet per second for each thousand of population; although this matter as to what population such dilution would take care of or such volume of water would take care of was not specifically passed on at that time.

It had other collateral merits which were mentioned. It would lend itself to the development of an inner harbor here in Chicago and would provide the water supply required to produce a deep waterway to the Gulf and would contribute to the extent of the cost of the main channel of such deep wa-

terway, without expense to the State or to the United States, all of which were motives which left no doubt as to the proper scheme to select.

1727 Following this report, a bill was introduced in the General Assembly known as the Hurd Bill, the same being drawn by Harvey B. Hurd, an eminent constitutional lawyer of Chicago, which provided not only for the construction of this work, but also for taking over the sewer system and eventually the water system of the city, so as to combine under one jurisdiction all elements of the sanitary problem in Chicago.

Extensive hearings were had, which were printed at the time, before a Joint Committee of the General Assembly, which went into the merits of the whole question as then understood. The General Assembly considered the subject matter unripe for action and postponed the Hurd Bill, and passed a subordinate bill known as the Roach-Winston Bill, which gave authority to divert the head waters of the Des Plaines River and North Branch to Lake Michigan and enter upon other expedients of temporary relief pending the development of the major project.

The General Assembly also authorized a Joint Committee to sit *ad interim* to investigate the whole subject matter and report back to the next General Assembly; and constituted the Mayor of Chicago *ex officio* chairman of this committee.

The Drainage and Water Supply Commission reported on the schemes covered by the Roach-Winston Bill, in July, 1887, and did project various measures of temporary relief such as extending the water tunnels, enlarging the canal out to Summit, or the Ogden Ditch, and putting in pumping works there to pump 120,000 cubic feet of water per minute, but none of these measures were actually carried out.

The investigation of the Drainage and Water Supply Commission continued after this report until November, 1887, and then the Commission was disbanded, without ever having made a final report or completed all the topics which it had

undertaken to consider. Following the disbandment of the Commission, I entered into the service of the State Board of Health of Illinois, as its consulting engineer.

The State Board of Health, in cooperation with the City of Chicago, had in 1885 and again in 1886, made an extended series of chemical analyses of samples from a number of points between Chicago and Peoria for the purpose of determining the effect of sewage in the Illinois River and the purification of the same. They presented a very sanguine report in 1886, in regard to the progressive oxidation of the sewage downstream, which was challenged and much criticized by the sanitary world as a misinterpretation of the facts; that the real cause of the purification shown was sedimentation and dilution, and not purification.

1728 The sanitary world at that time had been much impressed and still entertained the dogma which had been pronounced by the Royal Rivers Pollution Commission of Great Britain, which had issued a dictum much quoted even to this day, that there was not a river in Great Britain long enough to purify itself.

My work with the State Board of Health consisted of various examinations and consultations here at Chicago, special examination of the Illinois River, in which I twice examined the conditions produced by the distilleries and the cattle pens of the Corn Products factories at Peoria and Pekin, which were producing a condition in the Illinois River at that time for 20 to 25 miles below Peoria only less offensive than that which existed in the Chicago River.

In 1888, they undertook a very comprehensive series of stream examination of the Illinois River and its tributaries, and the entire route from Lake Michigan to St. Louis, and continued these observations into the winter months of 1889. And I undertook to work up the physical facts connected with the flow of the river in that connection. These results were published in a preliminary report in 1889, along with my own contribution respecting the Illinois River System, and were before the Legislature in the session of 1889.

In the spring of 1888, the special joint committee of which Mayor Roach of Chicago was Chairman, got busy and employed Mr. John P. Wilson as legal adviser and he called in consultation eight of the most eminent constitutional lawyers that were then in Chicago and the State, to determine the legal basis of a proposed Sanitary District Act. I was employed as consulting engineer to this committee; and in the subsequent months hearings were had in Chicago and in the Illinois Valley in relation to all matters in controversy.

I was called upon particularly to pass upon and determine the capacity of the channel, and adopted the prior determinations that it should have a capacity of not less than 600,000 cubic feet of water per minute, but that in order that Chicago would be better able to finance it, only the rock cuts were required to have this capacity at the outset; the earth cuts permitting progressive development with the growth of population; and it was so entered in the law, or in the bill then prepared.

The other question that I was called upon most particularly to consider was the subject of proper ratio of dilution.
1729 There was a difference of opinion in the Commission itself and in the hearings, ranging from 14,000 cubic feet of water per minute for each 100,000 of population up to 30,000 cubic feet of water per minute, and the subject matter was finally referred to the consulting engineer to make an exhaustive investigation as possible, and that whatever findings he made in the premises would be satisfactory to all parties.

At that time we had not only our own investigations here in Chicago and in the Illinois Valley, which perhaps were more comprehensive than had ever been undertaken upon a similar subject and upon a much larger scale.

And we had also the very excellent reports of the Massachusetts Board of Health, and some from other New England States going back for 15 years or more, dealing particularly with the subject of river pollution. We had also all the reports that had been made by Royal Commissions in Great

Britain; the reports in regard to Paris and Berlin, and other foreign data.

In addition to this, I made a special compilation of the population of American cities in relation to the low water supplies of streams into which they discharged their sewage. So I felt then, and feel now, that we had all the data which was available for such a consideration. We had on the one hand a city so situated and conditioned that all the sewage that was produced by its population was practically tributary to the sewer system, perhaps more completely so than in any other city of the world . We had also at that time the established leadership in the preparation of food products of vegetable and animal origin, and the waste from those sources in themselves amounted to the equivalent of a very large city. But in respect to this matter, it was reasoned that there had been a very great development in by-products from these industries in the past, and that probably by the time the capacity of the channel approached exhaustion these wastes would be all converted into useful commercial products, so that there would remain substantially only the domestic sewage in the eventual windup.

On the other hand most of the data existing here and abroad were cases of actual pollution of streams, of natural streams which were all highly charged, in some cases to their practical limit in digesting the organic remains from the land. That matter had come up for very careful and full consideration in the studies by the State Board of Health, or under the direction of the State Board of Health, and we had made estimates of the organic product from the Illinois water-
1730 shed, a very rich watershed, in its vegetal cover which showed that the organic wastes coming to the stream from this source were manifold.

These facts had led to very high estimates in different localities and in different countries in regard to the ratio of dilution that was tolerable in streams; whereas we had at Chicago a lake water charged to its limit with oxygen, in fact surcharged much of the time, so that it was not a case of

river pollution in fact, but a case of contributing a new stream to the Illinois carrying its own standard of purity.

After going over all these matters which I have outlined, I determined the ratio at 20,000 cubic feet of water per minute for each 100,000 inhabitants, as a minimum. The bill as drawn was submitted by the committee to the General Assembly as its report, February 1, 1889, and was passed in May of that year without any amendments whatever as affecting the sanitary provisions of the bill.

I was instructed to remain in Springfield by the Mayor of Chicago, and was eventually left in charge of the measure after the preliminary hearing. I am able to say that every feature of the bill that affected the Illinois Valley was canvassed at great length. In my work for the commission, I had the assistance of a party of men, among others Mr. John Erickson, now City Engineer of Chicago; and we were called upon and did compile everything relating to conditions in the Illinois Valley, and made the best estimates that it was possible to make at that time regarding the effect of this volume of water in the Illinois Valley. And those matters were fully explained.

In order to further safeguard the interests of the Valley, provisions were put into the bill to remove certain dams belonging to the State. A supplemental bill was drawn. I myself drew it at the request of the Valley interests providing for a cession of these dams to the United States, on condition that they should remove the same and change its policy to a deep water policy in conjunction with the water supply from Lake Michigan. In the event of the United States not accepting the same, the canal commissioners were directed to remove the dams whenever the water turned down from Chicago should give an equivalent depth for navigation.

1731 A joint resolution was passed by the General Assembly, which I prepared by request stating the policy of the State, which was to produce a channel not less than 22 feet deep across the Chicago Divide to Lake Joliet, and not less than 14 feet deep thence to Utica, so fashioned as to permit fa-

ture increase in depth, and requesting the United States to stop work on the dams at La Grange and Kampsville and enter upon a policy of deepening the Illinois River by dredging, in conjunction with this water supply from Lake Michigan, and produce such depth as might be feasible by such method. This resolution was repeated in 1897, which I also drew by request, and there the proposition is mentioned of 14 feet through the Valley, which is the origin I think of that phrase.

Our examination of the Illinois Valley had determined that 14 feet could be produced by the aid of this water supply; and that by producing such depth of water, this channel would be self-sustaining and not subject to depreciation and would make a better drain for the Valley, and assist in the reclamation of the lands. All these matters were prime factors, as well as another matter which was uppermost in the minds of the State Board of Health and in the minds of the General Assembly, and that was that the solution that served Chicago would likewise serve all the populations that could exist between Chicago and the Mississippi River, by reason of the progressive purification of the sewage, through which it could take on an additional burden from point to point.

After the passage of this bill, the subject matter of a petition for the organization of the Sanitary District was taken up by the Citizens' Association, and I acted as consulting engineer to the petitioners and prepared a number of exhibits which were submitted to a committee of Judges of the Circuit Court, which was provided for by law, who held hearings and entertained objections in respect to the proposed boundaries of the District, and to finally determine the same. These hearings were continued over a number of days, and all interests subject to taxation within and without the proposed district appeared. And it became necessary to develop before this Commission a complete project, to determine you might say a complete project by which the Commission could judge that every part of the territory which it was proposed to tax would be benefited and could be served.

They finally determined the boundaries of the district on the North by the north line of Lake View and Jefferson; on the West, the west line of Cicero, and along the range line through the township of Lyons, including outside thereof some eight square miles along the Des Plaines River below Riverside; thence easterly along the south line of the
1732 Town of Lake and across Hyde Park at 87th street; the same including 185 square miles.

At the time of the passage of the Sanitary District Act, this area was divided up into a number of municipalities. The city of Chicago itself covered 37 square miles and had a population in 1888 of 802,651; the town of Lake View 42,339; Jefferson, 10,622; town of Lake 56,661; Hyde Park north of 87th street 41,000.

All these areas above scheduled were consolidated with the City of Chicago at the general election in 1889 by authority of an act of the General Assembly. There was in addition the town of Cicero, with a population of 13,926 and a part of the township of Lyons with a population of 1,293, and these together aggregated nearly 1,000,000 (988,329). The proposition was voted upon at the general election in November, and the Sanitary District Act was adopted by vote of 70,000 to 200, in round numbers.

In the December immediately following, a special election was held for trustees; and the Board finally organized as a Board of Trustees of the Sanitary District in January, 1890, and elected its officers. I was elected Chief Engineer for the Sanitary District, and entered upon my duties at once. These consisted in bringing together all the data and exhibits that had been prepared during the prior investigations until the Supreme Court decision affirming the validity of the act was handed down on June 12, 1890.

Immediately thereafter an engineering force was organized on a large scale and proceeded with the definitive surveys which preceded construction, and the actual carrying out of the work itself.

At that time, our particular studies and surveys were directed towards locating the main channel and the river diversion from the Chicago River to Joliet, and making all land surveys required in connection with acquiring the right of way; and of course with a view to putting that work under construction as soon as possible.

Later, and in the course of my first term as engineer and trustee of the Sanitary District we completed compre-
1733 hensive surveys extending over the entire area of the District and outside of the same for the purpose of taking up the border definitions on the collateral projects.

The plans except as to details and except as to specific definition had all been practically determined before the law was passed, and were exhibited with all needful detail before the Committee that determined the boundary of the District.

The plans of that period not only exhibited an auxiliary channel from the main channel to connect with the little Calumet River, but also the Evanston Channel. In fact the Calumet proposition was worked up by the preliminary report of the Hering Commission in 1887 and was always regarded as one of the integral parts of the comprehensive plan.

It was further developed or reported upon in 1896-7 by the Intercepting Sewer Commission of the City of Chicago; and also considered at length by the Committee on a comprehensive plan in 1901. I was a member of the Intercepting Sewer Commission and also the Committee on Comprehensive Plan.

Plans with reference to intercepting sewers for the city of Chicago were considered from the beginning, and plans were actually made in connection with the disposal schemes in Indiana and in the lake for intercepting the lake shore sewage, and this matter was taken up in final preparation for work by the Intercepting Sewer Commission or what was known as the Pure Water Commission of the City of Chicago in 1896, and definite plans prepared which have since been car-

ried out with some amendments covering the entire city front from 87th street on the south to the northern city limits. There were two of the sewers that discharged into the lake under the old Chesbrough plan, the one at 12th street and the one at 22nd street, and they were actually reversed on or about this time.

The Sanitary District was instituted for the specific purpose of carrying out the projects which were outlined prior to its organization, and had proceeded by September, 1890, in the definitive surveys in relation to the main channel from the Chicago River to Joliet. They had also instituted sur-
1734 veys on the Chicago River with a view to the definitive surveys for its enlargement.

When I became chief engineer in January, 1890, I proceeded immediately to further work upon those plans for the Sanitary District.

There was nothing left to do except to define the things on the ground, practically. The genius of the whole proposition from the outset, held in mind unvaryingly, was to keep the flow of sewage away from Lake Michigan as far around the rim of the lake as was practicable.

After December, 1890, when I ceased to be the chief engineer I again resumed my connection with the State Board of Health as consulting engineer, with a view of completing the report which had been made in preliminary form in 1889, and putting the whole subject matter of our knowledge of the conditions in the Illinois Valley in proper form for printing and record.

1735 No water supply has ever been entertained for the City of Chicago except Lake Michigan. and no other source of water for the city is really feasible, except Lake Michigan. The water supply from all the Great Lakes has been regarded perhaps as superior to any source of water supply elsewhere existing in this country, by reason of the age of its waters, through which all the biologic processes of nature have worked

themselves out, those that are in any way detrimental to human kind.

The average flow over Niagara Falls would take one hundred and fifty years to drain out the contents of these lakes, if they were not replenished and in the absence of evaporation. The Chicago Sanitary Canal, if operated at 15,000 second feet, would be supplied for 2,000 years, so the average age of the water of the lakes is 150 years.

There is no possible substitution for these waters, which could equal them in value or efficiency. There is no possible treatment of water which is the equivalent of these aged waters. The matter of age in waters has been given in
1736 the last few years a very great deal of consideration.

Mr. Frederic P. Stearns of Boston in the Metropolitan Boston Supply projected a reservoir there and places considerable stress by reason of the fact that the average age of those waters will be six to eight years, and they will have time to whiten and bleach, and work out their biologic cycle.

The same proposition I had up in connection with the Denver water supply where I was instrumental in constructing a reservoir that would carry three years' supply for the City of Denver, and secure the same object.

There is very little land water going into the south end of Lake Michigan; the nearest point of any tributary of considerable size being the mouth of the St. Joe River, more than 60 miles away.

The sanitary project contemplates and has contemplated from the outset extending this divorce between land waters and lake waters as far around the rim of the lake as possible; north to Lake Bluff at least, on the north and east across Lake County in the State of Indiana; and when the proposition is entirely worked out there will be some 60 and 70 miles of the lake shore entirely free from the intrusion of any land water or sewage whatever. And this puts Chicago in a better position in relation to its water supply, and secures for it a better water supply than is provided for perhaps

in any city in the world; one that is automatically free from contamination or possibility of contamination.

After 1883, the Illinois and Michigan Canal was operated up to a limit of 60,000 feet of water per minute or a thousand feet per second, which was little in excess of the ordinary flow of the sewers coming from the water supply and the ground waters; and the result was that any rain of any considerable amount that produced any run-off at all in the sewers or in the watersheds outside of the sewerage area
1737 produced a flow towards Lake Michigan, which entered the lake water and contaminated the same.

There were also conditions where lake fluctuations produced a similar result. This bobbing of the lake up and down, which I have observed through a range of eighteen inches every twenty minutes, had the effect of sending the current up the river, and then set it back again, amounted to a species of milking process, by which the content of the Chicago River was gradually milked out into the lake.

Again, there were other changes; sometimes the lake would be up an extra foot, and all the bad waters would be sent up the slips and the South Fork and North Branch, and fish would attempt to make a trip through the blue waters of the river and the lake would fall as quickly, and all the bad waters would set out into the channel, and we would have large numbers of dead fish in the river and in the canal.

The South Fork was without circulation during this period, and in a malignant condition.

The North Branch had only the nominal circulation created by the Fullerton avenue conduit, which was changed once in about three days and was in a bad condition. Of course in flood time, when there was any considerable amount of water, the contents of the river went out in a most affirmative way into the lake.

I will say, further, that the duration of this positive flow into the lake was variable. Under the conditions of the flood of 1881, it probably was not less than 100 to 120 days; prob-

ably in the minimum years not less than twenty-five or thirty days, but that is an estimate and not a positive determination.

The smells were affirmative in the North Branch along the main river, and beyond any power to describe the same in the South Fork. In the examination which I made in 1887—1886 rather, I was on the river in a tug for several days dredging every acre of its content to ascertain the character of the deposits on the bottom. These were brought up and spread over a broad table on the fantail of the boat and examined carefully by working them over with a paddle and examining them with a glass, and samples of them taken from time to time for more critical examination. And in my trips up the river, and especially up the South Fork, men were
1738 so nauseated that they were unable to take their meals, and some of them did not recover for a week.

At times there would be a scum, sometimes extending clear across the South Fork, which appeared to be six or eight inches thick, and over which the fowls, geese and duck of that region, proceeded without difficulty. I have heard of that scum having been afire; and the vessels that went up into those forks lost their white paint very quickly.

There was noticed, however, in the death charts which I prepared in regard to zymotic diseases in Chicago, covering the years 1890, 1891 and 1892, that the deaths from miasmatic or air-breathing diseases seemed to be more prevalent in the region where these bad gases were most intense. And in the inquiries which I made at that time among physicians, it was generally recognized that throat troubles and other air-breathing maladies were more malignant where these emanations were breathed.

This pollution of the Lake Michigan water had an effect upon the death rate from typhoid fever and other water-borne diseases.

I investigated a typhoid fever epidemic in Lake View in 1889 for the State Board of Health, and later followed the

matter up in 1891. The epidemic that started in Lake View continued with ups and downs through 1890, 1891 and 1892, and then gradually subsided.

In 1891, the death rate in Chicago was 480, I believe, in May of that year, and for the entire year the number of deaths from typhoid as then diagnosed was something over 1,700.

Estimating the population at 1,000,000 within the city proper, it would be 170 per 100,000.

1739 I sent men to the health records, or to the records at the City Hall and we went through the entire list of deaths of the year. At that time they were not classifying and printing a classified statement of deaths. We made a card for each name for each location, and then proceeded to spot it out on the map. In that way we made up the charts for the years 1890, 1891 and 1892, for the particular purpose of disclosing that epidemic, and also the relation of other zymotics.

I was elected as trustee, and took office as a trustee in December, 1891, and continued in that position until December, 1895, and during that period we executed the Des Plaines River diversion, a collateral work of the main channel, by which the river was given a course by itself on the west side of the Des Plaines Valley, so as to leave an intermediate strip between the river and the canal, on which we located and built the Drainage Canal.

At the end of 1895, excavation on the Main Channel was about three-fourths actually made or completed. The right of way had all been procured at that time; the contracts for the Main Channel were also arranged before the close of my term as to be completed in November, 1897.

I was consulting engineer of the District in 1897, and we were overtaken at that time with a financial stringency, which seriously embarrassed the progress of the work of the District. The work was proceeding faster than the District could get the funds to pay for it, and so the real work on the channel, the Main Channel, which was scheduled to be completed

in November, 1897, was not actually completed until about November, 1898, when it was substantially completed, and the District then notified the Governor of that fact and asked for the appointment of a commission. The first action by the Board on that matter was in November, 1898, and the petition actually was transmitted to the Governor in January, 1899, as I recall it.

1740 There was a delay at that time in view of the fact that the state had made no appropriation for the maintenance of this Commission, and the Sanitary District deposited the necessary funds with the State Treasurer, and the Commission proceeded later to perform its functions, and the Sanitary Canal was finally opened on the recommendation of the Commission to the Governor, January 17, 1900.

The channel was then opened and the water flowed through the Main Channel into the Des Plaines River, and has been flowing continuously ever since.

Very elaborate surveys were made of the Chicago River for the purpose of defining the property questions at the place of the enlargement while I was a trustee of the District prior to 1895; and the work of actual enlargement of the river began in 1896.

The United States took jurisdiction of the Chicago River and exercised authority over it for the first time under the clause in the Rivers and Harbors Bill of 1896, and a permit was then issued to the Sanitary District for the improvement of the stream, by the Secretary of War. The stream was prepared for a flow of 300,000 feet of water, the preliminary requirement of the Sanitary District law, some time prior to the opening of the channel.

After the flow of water had been established, in 1900, the Sanitary District then matured plans for enlarging the river for the purpose of getting the larger quantity of water required by the Sanitary District Act, and actually entered upon that proposition in 1900; and the whole subject matter was before the Commission on a comprehensive plan of 1901, of

which I was a member, and the trustees went to the Legislature and got an enlargement of their bonding power for the purpose of expediting the work in 1901.

The improvement made prior to the opening of the channel was simply preliminary improvement. It was recognized that in order to obtain this flow in the quickest possible time
1741 and at the lowest possible expense, it was recognized that there would have to be a wholesale improvement from the beginning, such as was undertaken in 1900.

I refer to a resolution passed by the Board of Trustees of the Sanitary District of Chicago on April 21, 1891, appearing in the printed proceedings of the Board as follows:

> "Resolved, That this Board hereby ordains that the Sanitary District of Chicago do forthwith enter upon, use, widen, deepen and improve the Chicago River from its mouth at Lake Michigan to the South Branch thereof, and also the South Branch thereof, together with the South and West Forks thereof, so as to make the same a proper and sufficient supply channel for the Main Channel heretofore surveyed from the Chicago River to Joliet;
>
> And further, that the acting Chief Engineer be and he is hereby directed immediately to investigate and report upon the capacity of said river and its said South Branch and Forks for that purpose; and also as to any changes that should be made therein. And that a copy of this resolution, certified by the Clerk, be forthwith transmitted to the Mayor and Common Council of the City of Chicago and the Secretary of War of the United States."

The Chief Engineer of the District went ahead and made an exhaustive survey of the Chicago River from Robey street to the lake, defining all property rights and cross sections of the stream, with a view to definitive plans for the improvement of the river. And these surveys were completed prior to 1895. They were followed by definite plans for the improvement of the river, which were inaugurated in 1896, in cooperation with the United States, which made an appropriation for the improvement of the river in that year; and the river was improved to a depth of twenty feet by dredging the stream. And the bad angles in the stream were cut off,

and in some places the river was widened, and in the vicinity of Adams street and Jackson street, by-passes were con-
1742 structed at the constricted parts of the river, in that vicinity, for the purpose of giving the preliminary flow required by the Sanitary District law of 300,000 cubic feet at the velocity of one and one-fourth miles per hour.

These surveys were also used as the basis of the larger improvement which was immediately defined and inaugurated after the opening of the channel in 1900, for a capacity of 10,000 feet per second.

That plan consisted in bascule bridges in the stream of a uniform width of 200 feet, and a central depth of twenty-six feet; and has also been carried uot in part with the cooperation of the United States.

The capacity of the Main Channel at the Rock Section was actually 840,000 cubic feet per minute.

The occasion for making further improvement in the Chicago River and its branches after 1900, by the Sanitary District, was to get the increased capacity which was required with the growth of population, after the initial capacity of 300,000 feet had been established, and to accommodate
1743 600,000 feet by way of the Chicago River, and later that was supplemented by the flow by way of the 39th street conduit.

That new improvment or the improvement after 1900 was known as the Chicago River Improvement Project of 1900.

If the flow through the Sanitary District Canal had been limited to 5,000 cubic feet per second after 1900, it would not have been necessary for the Sanitary District to have made the changes and alterations in the Chicago River that it subsequently did make after 1900.

1746 Amounts expended on Chicago River improvement:

Total expenditure up to and including 1899	$ 727,441.02
Expended in 1900,	837,165.39
Total expenditures up to and including 1900,	1,564,606.41
" " five-year period, 1901-1905,	6,727,708.34
" " up to and including 1905,	8,292,314.75
" " five-year period, 1906-1910,	2,082,229.92
" " up to and including 1910,	10,374,544.67
" " two-year period, 1911-1912,	266,194.85
" " up to and including 1912,	$10,640,739.52

The building of the Main Channel and the improvement of the Chicago River which is a part thereof has extended lake navigation to a depth of twenty-four feet, thirty-six miles from Lake Michigan and within a mile or two of the City of Joliet. Lake navigation has not yet developed on a scale of twenty-four feet, but is predicated for that depth by the new lock now under construction at Sault Ste. Marie.

Below the water power station at Lockport, navigation is extended by a lock constructed by the Sanitary District suitable for small boats down to Dam Number 1, at Joliet, two and six-tenths miles; and this channel is twenty feet or more in depth for most of the distance, and a limited depth of ten feet after it reaches the Des Plaines River and the upper basin at Joliet. Navigation by small craft can extend to Dam Number 1 at Joliet.

1747 The Sag Channel is of smaller dimensions than the Main Channel, and is available for barge navigation of any draft of barge which can pass under the bridges, such as has been repeatedly recommended by federal engineers, in connection with the route between here and the Mississippi.

At the end of the Main Channel near the power station, thirty-six miles from Lake Michigan, a location has been reserved for a lock of any dimensions that may be necessary or desired, by which the depths and capacity of the Main Channel can be extended down the Des Plaines River by future improvements thereof.

The jurisdiction of the Sanitary District, so far as producing channels for navigation is concerned, stops at the upper basin at Joliet. The state has projected from the end of the Sanitary Canal at Lockport at the waterpower station, under the report of the Internal Improvement Commission in 1907, and by virtue of the constitutional amendment adopted in 1908, a project by which the navigable depth available in the Drainage Canal can be extended to Utica over the rock-bound section and the high declivities of the upper Illinois River by means of five locks and four dams and the development of the pools between these dams. This project proceeds on the basis of twenty-four feet to the second lock at the head of Lake Joliet through the City of Joliet, where it is largely in rock cut. But from that point, the head of Lake Joliet to Utica, it proceeds on the basis of a preliminary depth of fourteen feet, to be deepened progressively as the needs of navigation shall require.

Further than that, there has been no actual legislative provision as far as the state is concerned. The state has expressed its policy in a number of resolutions and statutes, and the United States has been asked to cooperate to the extent of building the locks in that part of the river, under the constitutional amendment, between the water power station at Lockport and Utica, at a cost of about eight millions of dollars, and to make the improvement by dredging in an open channel in the Illinois River between Utica and the mouth of the Illinois River, a distance of 230 miles; and there provide a channel of a preliminary depth of fourteen feet, at a cost of about $8,000,000.

In other words, the proposition as it now stands is this: That the State of Illinois, by the Act of 1889, makes the Main Channel of the Sanitary District to the upper basin a 1748 navigable stream and gives the United States control of it whenever the river shall be improved below, and the Sanitary District has expended upon that and collateral works something like $80,000,000, and the State of Illinois has put itself in position, by act of the Assembly, to spend an additional $20,000,000 in extending, a total of about $100,000,000. And the United States has been asked to cooperate to the extent of providing $16,000,000; the effect of it all being to produce a waterway from Lake Michigan, 327 miles long, to the Mississippi River at Grafton, with all structures, and rock cuts in the same channel for a depth of twenty-four feet and a preliminary depth of fourteen feet in the river below the head of Lake Joliet.

Perhaps I may add in that connection that in the later consideration of the matter by the State after 1907, it is based on a flow of 14,000 second feet; and that the Deep Water Project is not practicable without the aid of the large water supply from Lake Michigan, which has been authorized by the State law.

Outside of that, we would be limited to eight or nine feet as the best that could be done.

These depths of fourteen feet were predicated by the original act and collateral legislation in 1889, and in all subsequent legislation, were based on a flow of 10,000 feet and the report of 1907 used that depth of fourteen feet as a preliminary depth, but states that with the aid of the 14,000 feet, it will be possible to continue twenty-four feet to the City of Peoria and twenty feet more or less from thence to the mouth of the river.

And I assume from the fact that the constitutional amendment was based on that report, that is the project. It is the one that has been advocated by the Lakes to the Gulf Deep Waterways Association, and the one that was presented to

Congress in the hearings of 1910, before the House Committee and before the Senate Committee, and Congress made conditional appropriation of a million dollars for the beginning of work, whenever an understanding should be reached with the State of Illinois regarding a plan of cooperation.

The Chicago River prior to this improvement was little more than an adaptation of the Chicago Creek, which 1749 was known before Chicago was here; and its capacity for carrying a flow of water was limited. It is difficult to make a comparison where the stream was so little adapted to the present purpose, and where the change has been so radical.

Originally the Chicago Creek carried twelve feet up to the Forks, and its original improvement, the first improvement, was based on a depth of thirteen feet, which was subsequently increased to sixteen, and the tunnels built under the river limited the use of the Chicago River to sixteen feet, until they were removed within a comparatively recent period. They were removed by the city at a very considerable cost, which should be added to the expenditure of the Sanitary District and the United States, in getting at the true cost of the improvement of the Chicago River.

When the Sanitary District entered upon the improvement of the Chicago River, it was approximately sixteen feet in depth.

The depth has been increased to approximately twenty-six feet, and that is the depth carried through the main channel, to the power house.

There were portions of the river that would run up to 200 feet and even 300 feet in width, and again other portions that were less than 100. The narrow portions have been widened, or are being widened, except a very limited area near the Pennsylvania Central Station, which has been greatly delayed.

It has been widened to a large extent throughout its entire length, the Chicago River and the South Branch, so much so that it could almost be considered a new river.

There were center pier bridges with openings varying all the way from sixty feet up, depending on the width of the river; and the openings have now all been made uniformly 140 feet or more, so that vessels can go down the center of the stream without interfering with vessels that are moored at the docks, whereas formerly with the old type of bridge, they had to crowd the dock line, making it unavailable, in order to pass through.

This increase of depth and width of the river and the changing of the bridges has been of very great benefit to navigation. Under former conditions the river in many places was so constricted and tortuous that boats of the model prevailing along in 1900, 476 feet in length or thereabouts, were unable to pass through the river.

Since then, we have had boats up to 617 feet in length which could pass through. The alignment has been corrected and the channel deepened to a limit of twenty-six feet for a width of 140 feet in the center and the bridges have been put in with that central opening, so that the river is now available for a type of vessels which could not be considered in the early history of the stream and up to 1900.

There has been a very substantial and material increase in the depths in the Des Plaines and Illinois Rivers. The lock and dam system built by the State between LaSalle and Havana provided for a depth of six feet on the mitre sills at low water of the Illinois River, and this low water has shrunk at times down to limits of 400 and 500 feet per second within the division that I am speaking of. The present flow of the Sanitary District would give six feet throughout all that reach above the plans of the old low water, to which you could add twenty inches for the depth existing under original low water. In other words you would have seven and a half feet under the natural conditions in the river between those points without the dams.

The Board of Engineers known as the Ernst Board, which reported in 1905, stated that with a flow of 4,200 second feet

it would be possible to obtain in the Illinois River a navigation considerably in excess of seven feet, without the aid of any dams whatever, and that there should be no objection to the removal of these dams.

It was examinations of these questions which led to the
1757 project of the State for an open river improvement in these parts without the aid of the dams.

The estimates which were made at that time, made largely by me and my assistants have proven to be conservative, and that we can obtain better navigation without the dams at Henry and Copperas Creeks, and the Federal dams at LaGrange and Kampsville, than we had supposed when the State fixed its policy in that matter; and that we can obtain the fourteen feet more readily than supposed, and obtain the twenty-four feet and the twenty feet which I mentioned above and below Peoria more readily than supposed.

The State dam at Henry was opened in 1871. The State dam at Copperas Creek was opened in 1877.

The Federal dam at LaGrange was opened in 1889 and the Federal dam at Kampsville was opened in 1893. They were all part of a project that goes back to 1866 and 1867.

Before the Sanitary District flow was established through there, at low water and at ordinary stages of the river, boats used the locks. At high water they passed over the dams without obstructions.

Not to be compelled to use dams of that kind, or locks, is a very great benefit on account of delays; on account of tolls charged at the State dam, though there is no charge at the Federal dam, and by reason of the fact that the capacity of the locks is limited and boats and barges and fleets have to be accommodated to the size of the locks. Boats without the dams today would come to LaSalle, and barge fleets would be made up there. They would not pass through the locks if the dams were absent.

1752 The Sanitary District has an estate between Robey street and Lake Joliet of between seven and eight thou-

sand acres; and under the law is permitted to develop dockage and utilize this property.

This property that the Sanitary District owns is adjacent to the channel and along the channel its entire length on both sides and was obtained for the purpose of facilitating the construction of the channel and the river diversion.

Taking the channel at thirty miles from Robey street, it really adds to the capacity of the Chicago Harbor and its potential value about sixty miles of dockage; and if the estate is developed further by slips, why the amount of dockage that can be thus developed is unlimited.

So that it would be possible to establish practically an inner harbor.

That is one of the propositions that has been held in view from the beginning, and was outlined in a report which I prepared in 1890, printed in 1891, that the Drainage Canal on its waterway site would be developed as an auxiliary to the Chicago Harbor, and that future industrial development would largely take place, by a natural evolution as the city expanded, alongside and down this channel into the state; and that view of the proposition was in harmony with sound public policy, as these growing industries with their wastes would thus be automatically cared for in the simplest and cheapest manner. So it had a double reason, both commercial and sanitary, for the development of a harbor and its appurtenances in that direction.

That was one of the reasons why the item was put in the bill permitting the district to develop that as incidental to its other purposes: In fact it was the view held in constructing these works that all collateral advantages should be utilized; all by-products that were possible should be cre-
1753 ated, with a view of mitigating the heavy tax burdens of the community. And I think that the Chicago Project in its entirety, involving the waterways and dockage and waterpowers and other things that it does is really the first example that we have in this country of a well considered,

scientific project of conservation, for all the collateral utilities are to be developed and utilized.

The Chicago & Western Indiana, which is the main Belt Road, crosses the channel near the city limits, between Robey street and Summit. And the Calumet Terminal, which is also a Belt Road crosses the channel a mile below Summit. And furthermore the E. J. & E., which is the Outer Belt Line, crosses our channel between the water power station and Joliet; and makes the channel accessible to the entire railway system. And in that connection, it may be remarked that the report of the Federal Officer at this point recommends the development of a certain amount of harbor facilities adjacent to the channel, in the vicinity of Summit.

These Belt Roads mentioned make it possible to bring all kinds of freight down to the Main Channel.

And makes it possible, if the channel is developed as I have indicated, to have arrangements for the interchange of lake and rail freight.

In my judgment the location of the Sanitary Canal is really the only practical and economical location for such an interchange about Chicago, the logical place for it to occur. It is centrally located with reference to our commercial facilities by rail. It is accessible directly by a number of the trunk lines, and this number is so large that it practically would do away with the switching charge for all the other lines and we would be rid of $5 to $8 per car on all reshipment business done at Chicago as at present.

On the other hand such facilities transferred more remotely to the South or North would subject the commerce of Chicago to that extra burden.

The Calumet-Sag Channel runs from the Main Channel 1754 at Sag, Illinois, to the Little Calumet River at Blue Island and is something over sixteen miles long from the mouth of Stoney Creek, at its junction with the Calumet River to Sag Station; about 17 miles from the beginning of the San-

itary Canal at Robey street, and about 13 miles above the power station at Lockport.

It runs through a natural depression or valley called the Sag Valley, which is only less adapted to the development of a channel than the territory along the main channel of the District. This route has always been regarded as a favorite route in official reports of the United States, and has been frequently recommended for development for purposes of navigation.

The United States has taken steps towards the improvement of the Little Calumet River for navigation up to the point where the Sag Channel will connect with the Little Calumet.

The Calumet River is already improved for a width of 200 feet and a depth of 20 feet up to what is called the forks or outlet of the Calumet Lake; and in the last Rivers and Harbors Bill, there was an item calling for a project for the improvement of the river up to Blue Island.

And that is the point at Blue Island where the Sanitary District Channel connects with the Little Calumet.

Under the plans laid out by the District, there will be free navigation into the Sag Channel from the Little Calumet River.

And free navigation from the Sag Channel into the Main Channel of the District.

Any boats that would pass through would be able to pass through the Sag Channel, where it has a depth of 20 feet the same as the improvement of the Calumet River. Mean-
1755 while, craft can all pass up this route to Blue Island. It only requires deepening to adapt it to deeper navigation. There will be no limitation on the capacity of boats passing through except the bridges.

Navigation by the construction of this Calumet-Sag Channel, under the plans which the Sanitary District has adopted, and under which it is now being constructed well be greatly aided.

The flow of water has been and will be of enormous benefit to the Illinois Valley for two reasons; the first of which relates to sanitary conditions and the other of which relates to the physical conditions attending upon the river itself, and the overflow lands.

In a condition of nature, the Illinois River had in dry seasons an extremely small volume, which was measured in 1867 as low as 633 second feet. The reclamation of the swamps, which constituted 1/3 to ½ of the drainage in some watersheds and the tillage of the uplands has greatly reduced the low water supply and greatly increased the load of detritus which the stream has to carry.

The Illinois watershed is also one of the richest watersheds of the United States in proportion to its area, and produces thereby an enormous vegetable growth which quite consumes the water supply that falls in the growing season, leaving practically nothing to run into the streams. It happens by reason of these conditions that the stream is incapable of taking on any considerable load of sewage from the cities and towns located along its banks.

Further the stream bed is rapidly depreciating on account of the detritus from the uplands. These conditions at times under an ice cover when the organic matters in the water depleted the oxygen supply resulted in the decimation of the fish crop. Nevertheless, even prior to the opening of the Drainage Canal, by reason of the use of the river as an outfall for Chicago sewage and the very considerable increase in the low water volume which was doubled by the canal, even the old Illinois and Michigan Canal in low water seasons in
the upper half of the river, this fish crop had grown to
1756 large proportions, reaching from six to eleven and even
14,000,000 pounds; and was the best fresh water fishery in the United States, but was not a reliable industry.

The introduction of the water from the Sanitary District in comparatively large volume multiplying the low water supply at LaSalle by ten times, the low water supply in the

lower river by six or seven times, the fish crop became a reliable industry and has reached a magnitude under the census of 1908 of about 46,000,000 of pounds, of all kinds. And the value to the fishermen had reached over $800,000, and double that to the consumers. This crop represented $10 per acre on all the water space of the Illinois River Valley, or has been otherwise expressed, that the annual output was equal to 50 cents a lineal foot for the river.

Some idea of the magnitude and importance of this industry may be gathered from the fact that the output of this single stream represents ten per cent of all the fresh water fisheries of the United States, 30 per cent of all the fisheries of the Mississippi Valley, and is equal to 25 per cent of the entire fish output of the Great Lakes.

I think it is a fair assumption, and is so regarded by our Fish Commission, and by the Natural History Survey of Illinois, that this fish crop is largely due to the use of the stream for sewage disposal. The plankton in the Illinois River at Havanna, which is the basis of fish food, have been under examination by the Natural History Survey of this state since 1894; and since the introduction of the water in 1900, they recognize that the plankton have increased about from two to three times per cubic foot of water. And in view of the fact that the average flow of the stream has or will be doubled at Peoria when the channel is operated to a capacity of 10,000 second feet, the plankton content of the Valley will be increased from four to six times, and the fish crop stimulated proportionately, so that it is likely to grow to far larger proportions than even the present output.

This matter of the fertilization of waters is a new thought to people who have not considered the matter, but has been practiced from time immemorial in the fish culture in China, and is a recognized method of producing fish products as much as fertilization of land in the older countries, in the oriental countries.

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On the other side of the question, in regard to the physical conditions in the Illinois River, we have below Utica a stream

230 miles long with only 28 feet fall, or less than an inch and a half to the mile. The upper half of the stream, down to Havanna, has less than an inch per mile. There are conditions in the Mississippi River when if the Illinois River were low, flood waters would set back clear to Utica, and the stream would be level. There are other conditions in which the Illinois River might be assumed to be in flood and the Mississippi River low, in which the slopes would be doubled.

These conditions make the reclamation of the bottom lands extremely difficult and the maintenance of the river itself as a drain under the increasing load of detritus also extremely difficult. The only salvation, and that has been recognized from the beginning of this project, for the lower Illinois Valley is to introduce into that stream a large supply of water, to remove the dams and deepen the stream by dredging so as to maintain a channel of a good depth with a positive current that will be self scouring.

That condition cannot be produced in nature because the heavy flows in the Illinois correspond more or less closely with the heavy flows in the Mississippi, and with a large supply of water introduced into the Illinois River when the Mississippi is low, we can maintain a scouring channel; and the presence of the dams in that river is not consistent with maintaining such a channel.

Some recent examinations which I have made respecting conditions in the Illinois River show that since the state dams were erected at Henry and at Copperas Creek, there has been a depreciation on the upper half of the river of 2½ feet in the depth of the water below the original low water line of 1867, as it was defined in that survey. In other words, the river bed below low water has shrunk already, between the surveys of 1867 and the Ernst Board surveys of 1903, by 30 per cent; and the bank-full capacity of the stream has diminished by 15 to 20 per cent.

Further examination of the stream lower down shows that the Federal dams have been instrumental in contributing to the depreciation of that portion of the stream, and the only

remedy is to make a better drain of the Illinois by deepening it, without the dams, and introducing therein a positive and a large flow of water.

1758 This is important, not only from the standpoint of maintaining navigation automatically, as it were, without maintenance from year to year; but is of absolute necessity from the standpoint of conservation in the reclamation of the bottom lands themselves, of which there are some 40,000 acres between Utica and the Mississippi River. So from this standpoint, not only the interests of sanitation, the interests of the salubriety of the Valley itself, which will become a morass if present conditions continue or if the natural conditions continue, but also in the interest of reclamation of the bottom lands, a deep channel with a sufficient supply of water to maintain a scouring current therein is an absolute necessity.

On the sanitary side, as respects the disposal of sewage in this stream, such disposal was intolerable under natural conditions of flow, practically impossible by reason of the fact already stated, that the waters are already highly charged with organic matter from the very rich watershed, and particularly in flood times more than in low water.

I have seen, when I was examining the river for the State Board of Health, the output at Peoria alone, and at Pekin, from the wastes of the population and the wastes of the industries at those points, produce a black water through which fish could not pass, all the way down to the Copperas Creek Dam, a distance of 25 miles, when the river resumed its normal appearance.

This was significant, not only as to the ease with which the industries and the limited population polluted the stream in its natural condition, but was also very significant in regard to the progressive purification of the stream, even with that limited volume of water.

It was a material consideration in the Legislation of 1889, not only from the standpoint of the State Board of Health but also from the standpoint of all the Valley cities that this water

which served Chicago would through its progressive purification be able to serve also all the future population that might exist in the Illinois Valley in urban communities; and that in making a provision here as we did actually make for a population of over 4,000,000, we could assume at least that that would care for an additional future population in the Valley of 1,000,000. So that the Sanitary problem, from the state's point of view and the forces that prayed in the legislation of 1889 was a mutual problem, not only for Chicago but also for the Illinois Valley; the two representing over 70 per cent of the urban population of the entire state. To deprive them of this water would force all the towns in the
1759 Valley adjacent to the Des Plaines and Illinois Rivers to resort to artificial treatment, at very large cost, whereas their problems are now cared for automatically and without cost to themselves.

The problem presented of the disposal of sewage of a large metropolitan population like Chicago and its environs, which is included within the limits of the Sanitary District of Chicago, is materially different from the problem presented in the disposition of the sewage of a small city.

In small cities, they are not endowed usually with the industries of the great towns nor are their sewage wastes disposed of to the same extent by the sewer system as is necessitated in the large cities.

Again, in large cities, dimensions and magnitudes increase with the distances that have to be covered, so that the cost of any solution increases faster than the growth of population; or is out of proportion, you might say, to the growth of population, as compared to the small town or to the average small city, rather.

Removing sewage so that neither an effluent nor the raw sewage nor the rain drainage from streets, etc., would reach the water supply of the city is the very purpose to be attained with the greatest degree that it is practicable to do so. Fortunately, here, we can reach an ideal limit in that respect.

Any proposition that does not absolutely exclude sewage and land waters from the water supply is unsafe, by reason of the fact that no process of artificial treatment as now advocated, or of filtration of water supplies, gives immunity from any pathogenic germs that may be in the water; and by reason of the fact that any laxity in management or care is liable to bring about contaminations of the water supplies upon which the people may be relying as entirely safe.

I do not regard any proposition in connection with a water supply as safe, that is not automatic, and that depends upon human agencies and solicitude, under the civil service conditions that prevail in American cities.

1760 The Chicago water supply, on the other hand, can be made absolutely automatic and absolutely free from contamination, and the disposal of sewage can be put on the same basis, so that we can go away and forget about it; have no fear as to the consequences.

It depends upon the action of no person; does not depend upon the whims of an appropriation bill, or anybody's action as to whether they are exercising more care and vigilance than is necessary, or any of those things,—human frailties, it is free from. And experience has abundantly demonstrated that whereas in the early stages of these artificial methods much was expected of them in the way of absolutely arresting germ life that was deleterious to health; on the contrary none of them are quite safe. Filters and bacterial beds may get seeded down with the wrong kind of germs, so that the water supplies have to be watched with extreme care.

I think the best illustration of that is the recent report on the Milwaukee conditions by a Board of Engineers that is partial to artificial treatment, where they gather up the supply at the southern limits of the city, and after treatment pump it out into the lake as far south from the water supply as practicable. Then after doing this, they have to provide artificial methods for circulating the waters in the rivers in order that they shall not become offensive; and after going to

all this cost, they find that it is necessary to filter the water supply. And then they proceed to say that filteration methods, and slow sand filteration is so uncertain that it will be necessary to watch the results very carefully, and to be prepared at all times to doctor the water with chlorine or some other preparation to kill any germ life that may ecape the filters.

I think that probably is as severe a comment as could be made respecting conditions as they have been worked out for other cities not so fortunately situated as Chicago.

Chicago is the only city situated about the Great Lakes in which sewage disposal can be made through the back lots, and in which even storm waters for long distances along the lake shore may be absolutely excluded from the lake itself, 1761 the source of water supply. The pass that we have to cut down to divert our waters to the southwestward is only 7 to 8 feet as measured by the rock floor at Lemont above the low water of 1847; and only 2 to 3 feet above the high water of 1838, so that a channel can be cut in that direction at a minimum cost.

On the other hand, the lowest divide to the east between the waters of the lakes and the Ohio River is the Wabash-Maumée Divide at Ft. Wayne, which is about 190 feet above Lake Erie. And on the north is the Fox-Wisconsin Divide at Portage, Wisconsin, between the Fox River that empties into Green Bay and the Wisconsin River which empties into the Mississippi River, and this divide is 210 feet above the lake. So it is not possible at any other point about the Great Lakes to make a solution at all similar to that which has been provided at Chicago.

It is one of the endowments of our site, and it is the reason we are here, and it is the reason that the city is here; and from my point of view we are entitled to avail ourselves of it like any other bounty of nature, and to utilize the lakes in that connection.

From a conservation standpoint we utilize the lakes in that connection for all the utilities that can be worked out of it. It

is perhaps the highest conservation to which waters have ever been put in the world.

The investigations of the Sanitary District and of the
1762 State Board of Health in 1885 to 1890 considered a number of propositions of sewage disposal which were then seriously advocated as alternatives, and which are now regarded as obsolete.

The matter of land disposal, which is the most effective of all these methods is usually regarded as prohibitive on account of the cost, and because it can only be resorted to in favorable localities; and it is now recognized that if the effluents are to be disposed of in streams where water is used for water supply, that even in this case they must be sterilized. That was one of the principal methods advocated in 1886 and 1887 as an alternative.

The other plan of sewage disposal in the lake would not now be considered, even with sterilization, as a proper solution under conditions where it was humanly possible to do anything else. The objections are that sterilizing methods are subject to all the human limitations involved in the management of other methods, and are liable to be inefficient; sterilizing fluids are not considered as particularly conducive to public health and that even after sterilization the decompositions go on; there would be a tremendous pollution of the lake bottom, which would be a nidus in which deleterious germs might reproduce at a later period. And in a condition of stirring up of the lake bottom by wings, would make a very unwholesome looking water, if it was not actually dangerous to the health.

As applied at Milwaukee, as I have already remarked, they do not consider it, even with chemical treatment, to be a tolerable treatment without also at the same time filtering the water supply, and even after that sterilizing the water supply, after it had been filtered, when dangerous conditions appear in such filtration effluents.

It is recognized that disease germs will pass through even filters that are used for the purification of waters that are not contaminated with sewage. Unhappily, they get seeded down at times with the wrong kinds of germs.

The third method which was considered but not reported upon, but however was much advocated at that time and appeared in bills before the General Assembly for consideration as alternatives were the methods of chemical treatment. The principal one of these was the scheme of Gordon H. Knott, which was endorsed by very influential men, including some engineers from Chicago, which contemplated a tunnel 20 feet in diameter to extend down to Joliet and there the sewage was to be treated and released to the Des Plaines River. The tunnel which was then projected would carry something like 1,000 feet of water per second, barely more than the present water supply of this city. It would not solve any of the other problems associated with the good health of the city; and
1763 the treatment of the sewage proposed by chemical means only removes from 30 to 40 or 50 per cent depending upon the character of the putrescible matter; so that the effluent somewhat stabilized would still go to the Des Plaines and Illinois Rivers, and in the known high condition of the organic matters contributed from the land would produce an intolerable condition and be an impossible solution.

The fourth method which has found advocates and was mentioned as an alternative in the St. Louis case is the method by septic tanks, which was developed however after our consideration here at Chicago. Abroad, it was known as the Cameron Tank Proposition, and originally contemplated decompositions without a supply of oxygen, or aeration, known as anaerobic, to be alternated with aerobic decomposition, or the presence of oxygen.

This is in effect the cesspool method, which through various appliances, or in the use of euphonious names is called a septic tank proposition. Everbody is familiar with the cesspool proposition as it existed before we had any method of sewage treatment, or any sanitary science, or where in the country

sanitary provisions have not been adopted according to the modern method. But it seemed to have taken on a highly scientific value when proposed by wholesale, in the minds of its advocates.

That was, to my mind, effectually disposed of at Chicago, so effectively that it ought never to have been advocated by anyone, because we had a septic tank on the largest scale possible in this world in the 64 acres of the South Fork; and we had it in the North Branch in an area of more than 100 acres, and the conditions produced were so totally intolerable and inadmissible that it always seemed to me an impossible method of solution for any considerable body of people.

There have been a number of works even in this state and in Indiana constructed on that plan, ten or twelve I think. I believe today there are only two of them in actual operation. So that method may be considered as having passed into disuse or having become obsolete, and it should never have been considered, in my opinion, in view of the conditions that were patent here at Chicago.

The later methods were an evolution from the experiments at Lawrence, in a large degree, and consisted of bacteria beds; first, what was known as the contact beds, consisting of a bed of stone in a tank from six to nine feet deep, which was charged with sewage a number of times each day, and it was in fact a bacteriological stock farm on a concentrated scale.

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The anaerobic decomposition was supposed to occur while the bed was filled with sewage, and then the water was allowed to drain out and was supposed to give place to the aerobic decomposition, and this was much practiced up to a recent time, but is now considered obsolete, or not exactly obsolete but is discarded for a method considered to be superior, which is the percolating beds, so called sprinkling filters, which also consist of a bed of stone or other material; it is also a bacteriological stock farm, and in which the decompositions are entirely aerobic, except that it is usually

recommended that some sedimentation be given in advance and a slight septic condition produced by ten to twelve hours in the tank before it goes on to the bed. That is the last remnant of the septic tank proposition.

This method is the only alternative, a survival of all the experimental methods that have been tried out in the last forty years, and it may be said that no alternative that has ever been suggested for Chicago up to this time has proven up in practice, even for a moderate sized city, much less a city of this magnitude.

The method of nature in the percolating filter proposition, in fact in all methods that are practiced is the oxidation method, precisely the reactions which occur by dilution except in the dilution method the gases are absorbed and the operation is without offense; and the danger from the passage of pathogenic forms is probably much less.

All these methods in early times and up to a very recent time were presumed to dispose of the pathogenic germs, but it is now recognized that even the percolating filter does not do that, and that it must be followed by sterilization if the effluent is to be put into any possible source of water supply.

In regard to the chemical treatment, that is practiced still to a limited extent in the outfalls at Manchester and at London, for the purpose of getting rid quickly of a certain unstable element in the sewage, which they throw down as sludge. In the case of London, this sludge is put into tank boats and 7,200 tons a day are taken out and dumped into the sea.

In the case at Manchester, they carry on their purification by bacteria beds and chemical means; mostly by bacteria beds, and remove the sludge to the sea, in order to save the conditions in the Manchester Ship Canal as far as possible from becoming a nuisance. And they even go so far as to purify the storm water and run that through beds also. I went over the Manchester Canal in the autumn of 1909, 1765 when the temperatures were moderate and rode from

Salford down to Liverpool on a sludge boat that was taking out a cargo of sludge to sea, and the Manchester Canal, with all the efforts made in the communities about the Manchester Ship Canal, to purify the sewage outflow before it was put into the canal, was not what I would call in a tolerable condition at all. So that what they consider a measure of success over there in regard to the purification of sewage, I do not think would be looked upon here as a tolerable condition.

I will say that in regard to the subject of efficiency, there is no method at the present time available that can compare in efficiency with the method which we have adopted here at Chicago; and there is no alternative which could be adopted which would give us a water supply of any character approaching that which we may enjoy in connection with the dilution method.

I would say further that all these artificial methods are very costly in operation and maintenance, whereas the method here is automatic in action.

I will say further that with the possible exception of Berlin none of these methods make any returns against operating expenses, and even in the case of Berlin it is contributory rather than in any sense a profitable investment, whereas in our case I look upon the conduct of the sewage effluent and its purification on its way to the Illinois Valley as having produced the most successful and profitable sewage farm that has been produced in the world, to the fish product in the Illinois Valley; and that we have really here the only tried out and completely successful proposition in the world.

At the time that we proposed the Chicago proposition, it was looked upon by a large part of the sanitary and scientific world, who admitted their own superior achievements and attainments, as a barbarous one. I think the sentiment in that respect throughout the world has radically changed, and that dilution methods are now regarded as the best and the proper method wherever water supplies are adequate for such a purpose.

I wish to add to that, as a tribute to our own foresight and sagacity, that we are far ahead today of the other parts of the United States and the rest of the world in regard to this subject of sanitary treatment as we were when Mr. Chesbrough projected the sewer system in 1855. And I believe if we had been able—this I consider very unfortunate for Chicago—to have worked out all the results and made a rec-
1766 ord such as should have been made of the investigation that preceded and accompanied this work that it would have been regarded as a monumental achievement and revolutionary of the whole thought of sanitary engineering at the time; and would have changed the public thought, scientific thought in the matter as completely as it was changed along in the forties when the filth theory of disease originated.

I refer to Mr. John D. Watson's report (of Birmingham, England) to the Metropolitan Sewage Commission of New York dated January 31, 1913, wherein in discussing the various methods of sewage disposal for the city of New York, he says (page 30 of book entitled "Preliminary Reports on the Disposal of New York's Sewage, Number VII"): "What influences me most in favor of scheme 4, is the conviction that where it is possible to remove the bulk of the sewage of New York entirely away from its source to the ocean, it should be so removed, although the cost may be somewhat higher than it would be under a project like Scheme 3."

The Metropolitan Sewage Commission of New York was constituted a number of years ago for the purpose of studying the conditions and remedies therefor around New York Harbor and Bay; and it has projected four principal schemes or alternative methods for the treatment of the conditions at New York, which are discussed by Mr. John D. Watson, engineer for the Borough of Birmingham, England, and also by Doctor Fowler, who is in the same position in relation to Manchester, England, which are usually regarded as the highest development of artificial methods of treatment.

The 4th method, which is the one endorsed by both Mr. Watson and Mr. Fowler, is estimated to cost about $100,000,000, and is substantially a dilution method so far as the same can be applied to the New York conditions. It consists of interceptors for the purpose of gathering up the sewage; conduits for conducting the same to a common outlet, and pumping works. And an artificial island is to be created in the sea opposite Jamaica Bay and out beyond the entrance of New York Harbor; and the sewage conducted to this point and released on the outgoing tide, with only such treatment and screening as are necessary to operate the pumps and the system as a whole.

1770 There are no currents in the lake except those induced by the winds, and they change with the changes in wind direction.

With the Calumet River reversed as it will be when the Calumet Sag Channel is completed and in operation, and the Main Channel of the District and other works in op-
1771 eration, as is provided by the Statute of 1889, and the project as now operated, I do not consider that there will be any pollution of Chicago's water supply from cities like Waukegan or other cities near or around the City of Chicago.

I cannot conceive of conditions which would bring currents of waters from that distance to opposite the mouth of the Chicago River, for instance. The probability would be so extremely remote as to be a vanishing quantity.

All our intakes are substantially this side of the Evanston line on the north and opposite 67th street on the south, and under such conditions, there would be no sewage effluent going to the lake nearer than Michigan City or nearer than Waukegan. There is just the possibility that under contingencies that might occur in an occasional year we might get a little pollution from as far as Waukegan; but I assume that the conditions at Waukegan will be remedied as they already have the authority to organize a sanitary district on their own account at that point. Certainly with

that done, I see no possibility of sewage pollution as affecting the water supply now taken at Chicago.

I think that after the beams are all out of our eye, we are bound to go after the moats that come from that source, and there should be some regulation that will prohibit steamers from dumping their wastes into the lake within a reasonable distance of Chicago.

Frederic P. Stearns, a witness for the defendant, whose qualifications have been heretofore stated (This Narrative p. 134), testified, July 26, 1913 (Vol. II, p. 1044):

The situation is extremely unfavorable for any other system of sewage disposal than that which the City of Chicago now uses. It is impracticable to obtain a water supply for the city from any other source than Lake Michigan, and in no other way can the water supply taken from the lake be as well protected from contamination as by the present general method of sewage disposal, which not only keeps the sewage from entering the lake but creates a constant tendency to draw from the lake any water that may become contaminated along its shores, and it keeps from the lake the necessarily contaminated water of its rivers.

1049 It is therefore in my judgment impossible for the Sanitary district of Chicago to reproduce by any other method of sewage disposal than that now used with the right to take from Lake Michigan the quantity of water, commensurate with the needs of the District from time to time.

1058 I believe the method in use is by far the best method; and I think it is also the only practicable method, practicable and efficient method of taking care of the sewage and protecting the water supply; but there may be some combinations of purification, or there may be some partial purification of the sewage which could be used in connection with the present method. But I do not see how the present method

could be abandoned, or greatly restricted in the quantity of water, and obtain results that should be obtained.

1077 I do not favor the discharge of the sewage of a great population into a lake from which a water supply is to be taken, in any case, without purification of the water supply; and even then I would place the intakes of water supply far from the place where the sewage is turned into the lake,

1078 if it were necessary. But it is very much better from a sanitary standpoint that neither the sewage nor the effluent should go into the lake.

Henry C. Adams, a witness for the defendant, whose qualifications have been heretofore shown (This Narrative p. 159; September 25, 1913), testified as follows (Rec. Vol. III, p. 1355):

I have made examinations of the records of the City of Chicago as to death rates from various diseases in the last twenty-six years.

Adams Exhibit 1 shows this computation, as follows:

1360

2—CHICAGO.

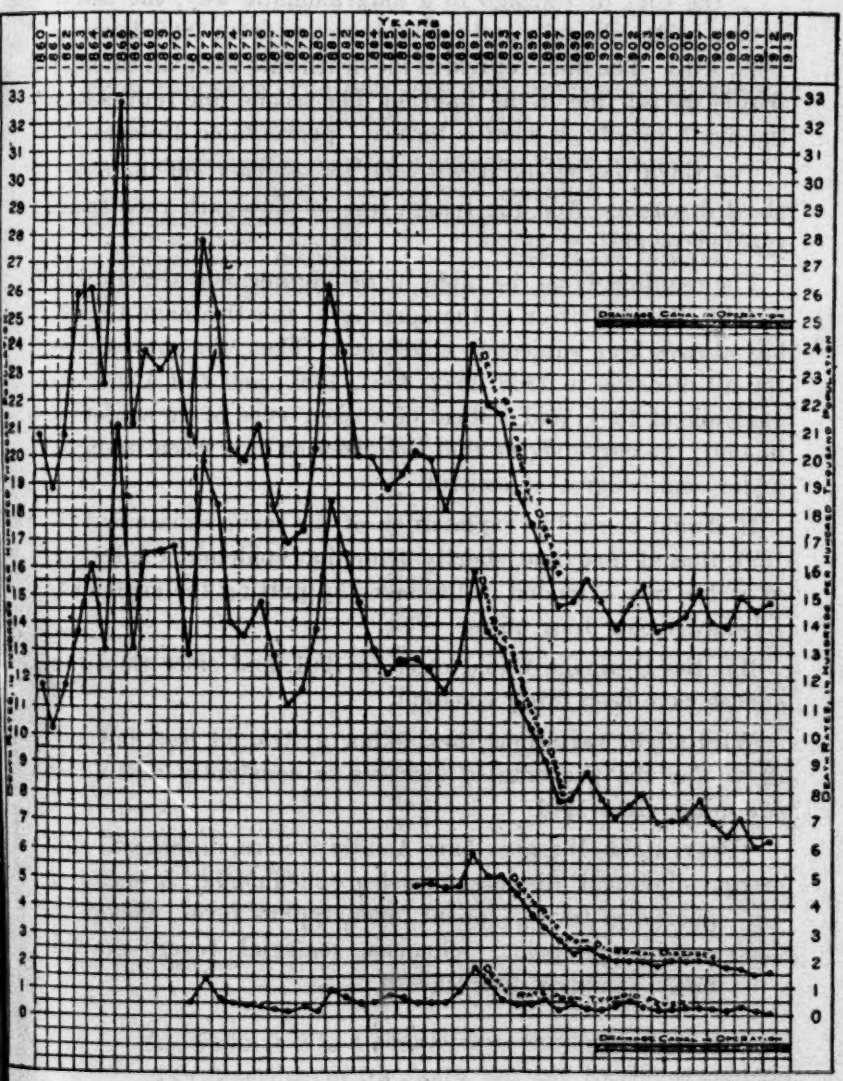
Death rates per 100,000 of population.

Years.	All Causes.	Typhoid Fever.	Diarrhœal Diseases.	Tuberculosis.	Pneumonia.	Bronchitis.	Influenza.	Diphtheria and Croup.	Scarlet Fever.	Tuberculosis of the Lungs.	Measles.	Whooping Cough.	Small-pox.	Bright's Disease.	Heart Disease.	Cancer.	Violence.	Tuberculosis other than Pulmonary.	Children under 5 years.
1887	2027	50.3	477.6	202.6	132.6	99.2	....	184.9	25.0	180.7	44.9	13.9	.3	42.1	72.2	39.6	126.8	22.0	996
1888	1965	46.7	457.2	201.3	137.7	102.5	....	161.6	22.6	182.1	13.8	22.8	....	41.1	77.1	45.0	110.5	19.2	939
1889	1812	48.4	465.6	181.0	126.0	87.3	0.1	161.4	19.6	164.9	21.8	10.3	.2	39.9	71.0	40.3	104.4	16.0	878
1890	1987	91.6	471.5	201.9	188.5	108.1	10.2	114.7	17.5	182.8	6.1	13.8	....	46.3	74.2	41.6	120.4	19.2	890
1891	2416	173.8	585.3	208.9	251.8	120.1	1.7	113.2	43.2	184.5	23.1	16.9	....	51.7	80.8	47.4	128.8	24.4	1097
1892	2185	124.1	606.3	198.6	199.8	108.6	3.6	129.0	31.8	182.3	15.4	13.7	.2	50.8	88.2	44.6	133.4	19.2	972
1893	2161	53.5	512.6	211.2	196.1	111.4	7.0	117.1	26.3	188.5	18.7	16.8	1.8	60.1	88.3	48.6	151.4	22.2	986
1894	1826	37.5	445.5	191.0	116.1	80.5	3.6	108.4	14.5	167.4	13.6	16.0	78.9	52.0	72.3	48.6	118.4	22.2	843
1895	1772	37.9	372.7	180.2	172.6	82.3	12.4	120.1	5.6	159.1	11.4	8.3	11.5	51.3	80.3	49.6	108.3	21.1	765
1896	1629	52.6	337.2	186.3	150.0	81.6	1.2	76.2	3.8	162.4	5.1	13.1	.1	57.3	88.3	51.4	103.7	24.5	680
1897	1463	29.3	278.3	172.6	144.3	68.3	1.0	51.6	4.8	146.4	9.3	10.7	....	62.3	91.6	49.3	98.1	25.5	574
1898	1464	40.8	241.5	181.7	159.1	68.3	18.0	43.7	4.8	155.2	3.5	13.4	....	67.5	89.3	50.6	97.5	25.5	525
1899	1568	27.2	253.5	178.9	211.4	62.3	19.1	58.4	32.8	154.7	10.3	4.7	1	72.6	91.7	54.7	97.5	24.4	546
1900	1468	19.8	216.2	173.9	190.5	65.1	9.4	49.5	13.3	153.0	11.4	16.8	.1	65.7	111.4	56.2	97.8	20.8	457
1901	1397	29.1	211.3	164.0	178.5	49.3	11.5	28.4	9.4	142.4	9.0	14.8	.2	67.3	111.1	57.2	98.9	21.5	428
1902	1473	44.5	201.0	165.4	190.6	54.3	6.6	24.8	24.7	141.9	6.8	14.6	....	69.3	116.5	59.6	104.4	23.5	445
1903	1562	31.8	194.6	182.5	290.1	54.3	9.6	24.4	16.0	155.0	14.6	14.6	2.5	61.3	113.0	57.4	130.3	23.1	447
1904	1410	19.6	177.7	186.5	217.3	45.5	7.6	21.5	7.5	164.8	11.5	5.4	2.1	62.3	107.5	58.2	108.3	24.1	371
1905	1413	16.5	192.5	188.8	184.1	43.5	4.1	22.7	24.7	161.3	6.4	18.4	....	106.5	108.3	61.1	108.3	24.1	438
1906	1453	18.5	197.0	192.0	202.5	38.3	6.6	27.7	35.1	171.5	12.8	8.4	.05	106.5	109.8	66.5	111.6	20.7	440
1907	1572	18.2	196.4	197.2	232.1	38.4	11.6	26.5	19.6	163.0	8.1	12.0	....	121.4	113.2	75.1	121.4	23.7	493
1908	1440	15.8	202.3	186.7	167.4	37.6	15.4	26.5	17.2	155.9	7.7	6.5	.05	102.0	128.1	74.9	118.1	22.1	458
1909	1458	12.6	171.1	181.0	219.6	6.8	8.1	21.7	18.4	153.3	8.7	7.9	.05	105.9	147.4	76.7	126.5	26.1	436
1910	1514	13.7	177.2	178.0	240.8	7.8	6.6	37.4	....	....	....	....	....	113.9	151.4	82.3	116.2	24.7	461
1911	1455	10.9	147.0	166.0	219.6	4.0	5.2	....	....	....	....	....	....	....	....	....	....	....	408
1912	1482	7.5	140.7	163.5	220.4	4.7	2.8	....	....	....	....	....	....	....	....	....	....	....	436

1361 The water-borne diseases are the typhiod fever and the diarrheal diseases, intestinal diseases in general. The impure air diseases are tuberculosis, pneumonia, bronchitis, influenza, grippe, and things of that kind.

1362 The decrease in the water-borne diseases is 56.9 per cent and the decrease in the air-borne diseases, computed in the same way, is 6.1 per cent.

1363



ADAM'S EXHIBIT 2.

1364 This table, Adam's Exhibit 2, presents the death rate in the City of Chicago in a diagrammatic way, the usual curves being adopted; and the table covers from 1860 down to 1912, 1913. The lines represent the death rate from all causes; that is the top line on the diagram. The second line represents the death rate from what is termed "preventable diseases."

The third line is the death rate, the curve from the diarrheal diseases. And the fourth line is the death rate from typhoid fever.

The readings from the table, or the significance of the table is that Chicago, prior to the opening of the Drainage Canal, has always been subject to epidemics. Thus, the curves rise for all diseases to 1866, 1872, 1881, 1891; and fall after the epidemic of 1891; and instead of a recurrence of an epidemic in 1901, the curve shows that the diseases have been brought under some degree of control.

It should be said in explanation of the curve subsequent to 1891, that at that time, shortly after that epidemic, the intake of water was extended in the lakes by putting the cribs out, I believe about four miles.

But the Drainage Canal came in 1901, and since then the curves have been fairly constant.

With slight variations they follow a straight line, but the curve for the preventable diseases is constantly declining, dropping, since 1901.

"Preventable Diseases" are Asiatic cholera, diphtheria and croup, diarrheal disease, measles, pneumonia, bronchitis, puerperal fever, typhoid fever, typhus fever, whooping
1365 cough, erysipelas, influenza, malarial fever, scarlet fever, smallpox, tuberculosis.

ADAMS' EXHIBIT 3.

6.

COURSE OF THE DEATH RATES

FROM IMPURE WATER DISEASES AND IMPURE AIR DISEASES

CHICAGO, 1887-1912.

COMPARISON OF TWO THIRTEEN-YEAR PERIODS.

Death-Rates per 100,000 Population.

Year	IMPURE AIR DISEASES (Tuberculosis. Influenza.) (Pneumonia. Bronchitis.) Total	IMPURE WATER DISEASES. Typhoid and Diarrheal Diseases.
1887	434.5	527.6
1888	441.5	533.9
1889	393.4	514.0
1890	508.7	563.1
1891	593.1	758.1
1892	515.6	623.7
1893	525.7	566.1
1894	401.5	483.0
1895	447.8	410.6
1896	419.6	389.8
1897	386.8	307.5
1898	422.7	282.3
1899	471.8	280.7
1900	447.8	236.0
1901	403.4	240.4
1902	416.8	245.5
1903	495.9	226.4
1904	454.3	197.3
1905	424.3	209.4
1906	436.8	215.5
1907	479.4	213.6
1908	407.6	218.1
1909	416.1	183.7
1910	433.2	190.9
1911	394.8	157.9
1912	391.4	157.2
	Average Rate.	Average Rate.
1887-1899	458.7	480.7
1900-1912	430.9	207.1
Decrease	27.8	237.6
Per Cent Decrease	6.1%	56.9%

This Exhibit 3 is a comparison for the two periods al-
1366 ready described of the death rate per 100,000 population from impure air diseases and the impure water diseases. The percentage result of that comparison has already been given.

The average decrease in the death rate for impure air diseases is but 27.8 per 100,000 population, whereas, for the impure water diseases, the decrease on a comparison of the average for the two periods, is 237.6, showing a decrease of 6.1 per cent in the impure air diseases and 56.9 per cent in the impure water diseases.

It is a well established fact, as shown by the statistics of cities before and after the introduction of the improvement of water supply, that the decrease in the death rate of the particular diseases held in mind, and usually this is typhoid fever, is accompanied by a corresponding decrease in the death rate of other diseases. And typhoid fever is commonly accepted as the basis from which to measure the general effects of the improvement of the water supply.

This relationship is what is known as Hazen's Theorem or Hazen's Law. It is universally conceded that the improvement that is reflected in typhoid conditions must be multiplied by some figure in order to get the general improvement in the health conditions of the community.

Here is a statement of Hazen's Theorem as given by himself, he says: "Where one death from typhoid fever has been avoided by the use of pure water, a certain number of deaths, probably two or three, from other causes have been avoided."

All my information on this point is taken from an article by W. T. Sedgwick, who is Professor of Biology at the Massachusetts Institute of Technology, and J. Scott McNutt, Health Officer, New Orange, New Jersey, published in the Journal of Infectious Diseases, 1910.

Professor Sedgwick is a recognized authority upon this
1367 matter in the United States. It was for the purpose of testing the accuracy of Hazen's Law that Sedgwick and McNutt undertook this investigation in American cities.

ADAMS' EXHIBIT 4.

Distribution of Deaths from Typhoid Fever, by sex and age. Chicago, 1912.

Age	Males	Per Cent of all Deaths of Males	Females	Per Cent of all Deaths of Females	Both Males and Females	Per Cent of all Deaths
1- 5	5	4.27%	4	6.8	9	5.1
5-10	5	4.27	7	11.9	12	6.8
10-20	18	15.4	13	22.0	31	17.6
20-30	42	35.9	20	33.9	62	35.2
30-40	22	18.8	10	16.9	32	18.2
40-50	18	15.4	2	3.4	20	11.4
50-60	5	4.27	1	1.7	6	3.4
60-70	2	1.7	1	1.7	3	1.7
70-80			1	1.7	1	.6
All ages	117	100.0	59	100.0	176	100.0

Males constitute 66.5% of all deaths, females 33.5%.
(Data taken from the records of the Chicago Department of Health.)

This exhibit shows the distribution of deaths from typhoid fever by sex and by age. The sex classes are under 5,
1368 from 5 to 10, from 10 to 20, from 20 to 30, from 30 to 40, from 40 to 50, from 50 to 60, from 60 to 70, from 70 to 80.

The third column of the exhibit shows the percentage of the total diseases borne by males at the various ages named. The significance, or the bearing of the table upon the question of the loss that might be suffered by a city in the absence of proper preventive causes for typhoid fever is that a larger percentage of diseases from typhoid fever is suffered by males than females; and that the age when typhoid fever is likely to result fatally for males is between the age, as shown here, between the age of 10 and of 60. Closer figures will show that between the age of 17 and 18 and 55 66-5/10 per cent of all deaths are male and 33.5 female. The figures here are taken from the records of the Chicago Department of Health.

I would add that the figures in this exhibit influenced me in choosing the multiplier in the application of Hazen's Law.

ADAMS' EXHIBIT 5.

II.

DECREASE IN VARIOUS DEATH-RATES SINCE THE DRAINAGE CANAL WENT INTO OPERATION.

Comparison of Two Thirteen Year Periods: (1887-1899) and (1900-1912)
Death-rates per 100,000 Population.

CAUSE	Decrease in Death-rate (1887-1899) (1900-1912)	Per Cent Decrease (1887-1899) (1900-1912)	Number of Deaths Prevented from cause named for every death Prevented from Typhoid
All Causes	398	21.3	9.3
Preventable Disease	418	36.9	9.8
Impure Water Diseases (as recognized by Chicago Dept. of Health)	274	56.9	6.4
Impure Water Diseases (as recognized by Sedgwick MacNutt)	*290	31.8	6.8
Diarrheal Diseases	231	55.2	5.4
Typhoid Fever	42.7	68.2	....

*1887-1899 compared with 1900-1912.

This exhibit is one designed to show the decrease in the
1369 various death rates since the Drainage Canal went into operation; first, from all causes; second, from the Preventable Diseases, and third, from the impure water diseases, as recognized by the Chicago Department of Health. Fourth, from the impure water diseases as recognized in the work of Sedgwick and MacNutt. Fifth, the diarrheal diseases. Sixth, the typhoid fever.

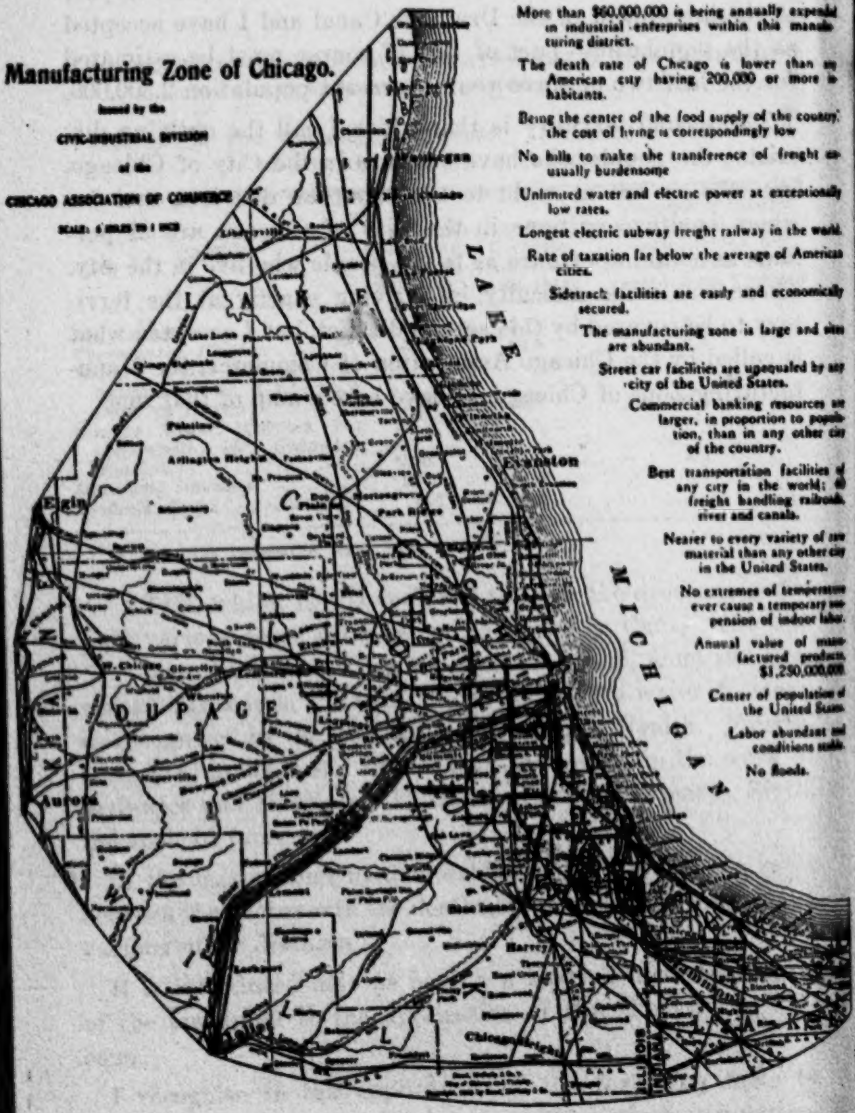
In the last column in that exhibit will be found the ratio between the decrease in the deaths from typhoid fever and the various other diseases.

It is introduced also as having a bearing upon the choice of the multiplier in the application of Hazen's Law to Chicago.

I recognize in the application of the foregoing facts to Chicago at least three territories with distinct population. The first is the municipality of the City of Chicago. This is

the narrowest possible conception of Chicago as a center of population. This is the unit that has bonded itself for part of the investment of the Drainage Canal and I have accepted as the population—part of this of course must be estimated for the last two or three years—present population 2,300,000.

The second territory is that which I call the outlying districts; the people who have business in the City of Chicago, but who go out at night to the suburban districts, and for whom health conditions in the City of Chicago are of perhaps as vital importance as to the people who live in the city. There was some difficulty in arriving exactly at the territory to be covered by this second district, but I accepted what is called by the Chicago Association of Commerce, the Manufacturing Zone of Chicago. I have here a map of that zone.


Manufacturing Zone of Chicago.
Issued by the
CIVIC-INDUSTRIAL DIVISION
of the
CHICAGO ASSOCIATION OF COMMERCE
SCALE: 4 MILES TO 1 INCH
More than $60,000,000 is being annually expended in industrial enterprises within this manufacturing district.
The death rate of Chicago is lower than any American city having 200,000 or more inhabitants.
Being the center of the food supply of the country, the cost of living is correspondingly low
No hills to make the transference of freight unusually burdensome
Unlimited water and electric power at exceptionally low rates.
Longest electric subway freight railway in the world.
Rate of taxation far below the average of American cities.
Sidetrack facilities are easily and economically secured.
The manufacturing zone is large and sites are abundant.
Street car facilities are unequaled by any city of the United States.
Commercial banking resources are larger, in proportion to population, than in any other city of the country.
Best transportation facilities of any city in the world; all freight handling railroads, river and canals.
Nearer to every variety of raw material than any other city in the United States.
No extremes of temperature ever cause a temporary suspension of indoor labor.
Annual value of manufactured products, $1,250,000,000
Center of population of the United States.
Labor abundant and conditions stable.
No floods.
LAKE MICHIGAN
DUPAGE
Elgin
Aurora
Evanston
Chicago
ILLINOIS
INDIANA

The factors employed in computing the community loss
1399 on account of premature death as working citizens are,
first: the number of working years annihilated by premature death. For any given person this is measured by the difference between the age at which death occurs and the normal expectation of life for that age. For the community, the average at which death occurs is the point from which the measurement is taken.

The second factor is the worth or value to be imputed to a working year. By the first, it is evident that we learn the
number of working years for each year annihilated by a
1400 premature death. If now we know the value to the com-
munity of a working year, the multiplication of the one into the other gives the desired result.

That is well established by actuarial methods. And in the case of typhoid fever, which is made the basis of this computation, the loss, the average age of those who died of typhoid fever is 29 and a fraction years. Now, the average expectation of life for that age, 29, is 66 years. If now we take 65 as the limit of working years, there is by a death of typhoid fever annihilated the difference. At that age there is an expectation of 36 working years for each person that dies. Therefore, the deaths multiplied by 36 years gives the loss to the community in years.

Now, the other element the value of a year is one that the actuaries have always dodged. They have made assumptions, but have never given the matter, in my judgment at least, sufficient analysis, industrial or economic analysis.

I have for the purpose of this case endeavored to analyze the community's interest in premature deaths. And by the community's interest I mean the interest of the community as though the community were a unit, an organization, an industrial corporation, you may say, of perpetual life. And starting from that point, the burden that must be placed upon current industry is the burden first of maintaining the current social asset, the important asset being in the number of

workers in existence, so that notwithstanding deaths there will be births, raising children, education of workers, who will come to supply the place of the worker so that what you may call the labor asset of the community will be maintained.

Every time there is a premature death, the community loses in this respect; that is, the fund for the maintenance of its industrial or social aspects is impaired.

It is also a burden or a duty imposed upon current industry to provide for the normal development of industry, the normal growth of society, increase in numbers and increase in grade, quality of labor, greater education; and that I call as distinguished from maintenance of development, the additions and betterments that come to this society, considered as an industrial organization. Those are the two elements that are attempted to be measured; and each of them is impaired by a premature death.

Then, third, there is a dissipation of assets, a dissipation of energy, dissipation of well being, dissipation of work,
1401 dissipation of time, on account of sickness and death, and the cost of the sickness being a burden upon the community, a burden eliminated if there were no sickness, and this class is recognized as the third element of loss. Those are the three elements on that side of the equation.

ADAMS' EXHIBIT 13.

19

Loss that would be sustained by the City of Chicago and dependent populations were the present facilities for obtaining an adequate supply of pure water impared or destroyed, based upon a comparative study of health statistics of the city for 13 years before and 13 years after the opening of the Chicago Drainage Canal.

Per Annum.

Per 100,000 of the Population.

Kinds of Loss	From Increase in Typhoid Fever	From Increase in Other Diseases
I. By Loss of Contribution to Maintenance:		
a. Through premature death of workers, 83% of 28.39x36x300..	$254,488	$636,220
b. Through sickness, 83% of (484x10) + (28.39x2) + 52x300	23,400	23,400
II. By Decrease in Capital Building:		
a. Through premature death, 42.7x36x40	28,256	70,640
b. Through sickness (726x10) + 52x40	5,581	5,581
III. By Unnecessary Dissipation of Resources:		
483x58.41	42,405	42,405
	$354,130	$778,246

$354,130x23=$ 8,144,900.

$778,246x23=$17,899,658, which is the annual loss to the City of Chicago.

In the same way and for the same reason that a corporation 1402 sustains a loss, a railway corporation sustains a loss in case its locomotive is wrecked ten years before its life has expired. It also must use its resources to supply the place of that locomotive. But the resources used to supply the place of the locomotive that is prematurely retired cannot be used in any other way. I think the analogy between a corporation maintaining its property and improving its property and a community maintaining its labor force and extending its labor force is very close.

Under the first item mentioned in the table, namely, "By loss of contributions to maintenance," there are two subitems, *a*: "Through premature death of male workers" and

b: "Through sickness." The formula for computing the loss through premature death of male workers is as follows: 83 per cent of 28.39 multiplied by 36 multiplied by 300. The 83 per cent of what will be the result of the computation 1403 following that figure in the formula is arrived at in this way: this computation rests upon the loss incident to the premature death of active workers, and it would therefore be improper to include all of the deaths as the computation should confine itself to the deaths from typhoid fever that occur during the working period.

Now, about 83 per cent of the deaths from typhoid fever occur within the working years, and for that reason only 83 per cent of the 100 per cent of computed loss is permitted to enter into the present computation.

The table upon which that percentage rests has already been submitted as Exhibit 4.

The figure 28.39 is derived as follows: as already explained, the decrease in the number of deaths from typhoid fever per 100,000 population since the introduction of the Chicago Drainage Canal is 42.7; this decrease being arrived at by a comparison of the average number of deaths per 100,000 population for the 13 years prior to the opening of the Drainage Canal with the corresponding figure for the 13 years subsequent to that event.

Now, the table of distribution of deaths from typhoid fever shows that males constitute 66.5 per cent of all deaths. The decrease in the number of males dying from typhoid fever, therefore, is 28.39 per 100,000 of population. That means in effect that the deaths of females are thrown out in this computation, although there are some reasons why females should be included in the productive population, as well as males. But here, as everywhere throughout the computation, I have taken the lowest of the figures that can be used.

The figure 36 is the computed expectation of working life at the average age of death from typhoid fever. This average age for the City of Chicago including all deaths at all

ages, is 29.04 years. The average expectation of life for that age is 37 years. If now 65 years be accepted as the average limit of the normal working period, it follows that the number of years lost to a community, of working years, resulting from a death caused by typhoid fever is the difference between 29 and 65 or 36 years.

That next item in the formula is 300. This figure covers that portion of current earnings, the expectancy of which is for a communal or community purpose described in the foregoing analysis. That rests upon the assumption that the general average income representing the productive ca-
1404 pacity of workers is some $700 a year. We are concerned here not simply with workers, men who get wages, men on payrolls of factories, but it is all members of the community, and really you should take into account men who earn from a dollar a day up to men of very high income, all of whom are subject to death from typhoid fever.

The amount that is required for the support of the worker, what you may call the personal expenditure of the worker is deducted from what is called the average productive capacity of individual citizens, and the remainder is accepted as the community loss on account of premature death. That is, the remainder measures the amount that is contributed from the income of the worker to the maintenance of the working fund, and the expense, the personal expense, the demand for or the occasion of that expense dies with the man, but to the extent that while a man is living he contributes to what is the community need, namely, the maintenance of the number of workers, the education and rearing of working men so that they can take the place of workers when retired on account of age, that is the community contribution of the individual, and that community contribution of the individual is what is destroyed by a premature death.

I have put it here at the low figure of $300, on the basis of a $700 income. There has been a great deal of analysis and work by economists in arriving at those figures. I do not

care to go any further into that unless it is desired that I should do so.

1405 On the particular question, namely the estimate of productive ability, perhaps the best authority is Dilfredo Tatreto. He has made a study of the distribution of incomes, and has established what some regard as law of the distribution of incomes, so that if it is known, according to his law, if it is known what the daily unskilled wage is, he can arrive at the average of the incomes from $300 up to $30,000.

1406 Men like Hoffman usually take $600 as the earning capacity and merely say that the earning capacity is equal to the productive ability of the worker; but that includes only the day workers, the unskilled and the low paid workers. And that rests upon the statistics of wages which are very voluminous and very carefully worked out. This law arrives at an income, not only for day workers, wage workers, but for others who create their own wages, pay themselves their own wages, and there the average would be according to this law for a dollar a day something like $700 or $800. I took the lower figure and estimated the amount of personal expenditure, and the difference is recognized as the loss suffered by the community on the occasion of the premature death of any citizen.

The second formula presents the loss on account of cases of typhoid fever which did not result fatally. The 83 per cent is arrived at in the same way as in the first formula described. The figure 483 represents the number of male cases of typhoid fever which occur annually in the City of Chicago, but which do not result fatally. It is arrived at by the multiplication of the number of deaths, 28.39 by the figure 17, which is the figure accepted as representing the number of cases of typhoid fever for every death from typhoid fever. My authority for that figure is the Pittsburgh Survey, and Whipple on Typhoid Fever.

The figure 10 is the number of weeks that each case that recovers is out of work. That assumes that the sickness and convalescence in every case covers at least 10 weeks; I mean that is the average of the cases.

The 28.39 in this formula has already been explained, this being the number of deaths, and the 2 is the number of weeks on the average prior to the time that the death occurs, which is a burden for the community in the same way that the weeks of sickness of those that do recover. This is divided by 52 to reduce it to years and multiplied by 300, which is the figure in the formula already described.

The second kind of loss is expressed in the table as a loss by decrease in capital building. That is, every worker, every member of an industrial community, during his active life, not only contributes to his own maintenance but contributes something to the fund of which he is a part and to take his place when he dies; he not only does that but he contributes something toward the increase of the working fund and towards the higher education, which is equivalent to the raising of the quality of labor. This is the same thing as additions and betterments in the case of an industrial corporation.

This also is submitted under two heads: *a*, loss through
1407 premature death, and *b*, loss through sickness. 42.7 in the first formula has already been explained. I ought to say before explaining these figures that in this case it is population as such that is taken into consideration, because we only know the increase in wealth and capital on the per capita basis, and therefore it is not the deaths of workers, the working age, but the total deaths from typhoid fever that must be considered.

Now the 42.7 in the equation under A is the average decrease in the death rate from typhoid fever during the 13 years subsequent to the introduction of the Drainage Canal as compared with the 13 years prior thereto. This is multiplied by 36, because this loss continues for 36 years. And the loss per year is computed at $40 on the authority of the United States Census that the increase in capital or valuation from year to year is about $40.

There is also added here a loss because of the decrease in capital building through sickness, which is 726 multiplied by

10 divided by 52 multiplied by 40, all of which figures explain themselves.

The third point in the formula is losses by unnecessary dissipation of resources. That is what is commonly called the sick loss. And I have taken 483 cases of typhoid fever that do not result fatally, and I have taken the result of the Pittsburgh Survey, giving 58.41 per case. That seems to me to be unusually low, and so far as I know it is the lowest figure that has ever been arrived at, and I think is too low, for the reason that this Survey in Pittsburgh had to do with the poorer people in the poorer districts, whereas, the question we are now interested in covers all citizens of Chicago, of all classes.

The figure 90 has been suggested but the figure 58.41 is the one that is used in this computation.

I think that explains everything in the table, except the question of multipliers. The character and need of Hazen's Law has already been explained, and this table accepts 2½ as the multiplier; that is, it accepts the Hazen Law, as originally stated, and not as modified in figures by Sedgwick and McNutt and others, who place a higher figure.

Isham Randolph, a witness for defendant, whose qualifications have been heretofore stated, testified as follows:

February 23, 1898, the Committee on Rivers and Harbors of the House of Representatives, U. S. Congress, inspected the Sanitary District works.

May 5, 1898, Russel A. Alger, Secretary of War, and Gen. John M. Wilson, Chief of Engineers, in company with the Governor of Illinois and the Board of Trustees of the Sanitary District, inspected the works and the main channel then constructed. (Rec., Vol. VI, p. 3591-92.)

As Chief Engineer of the Sanitary District, I determined the volume of flow of water through the channel, and laid out the improvement of the Chicago river, South branch and West Fork, in 1900, that is, for a flow of 8,000

cubic feet per second through the South Branch of the Chicago river, and 10,000 cubic feet through the West Fork from its junction with the South Fork of the South Branch to the northern terminus of the Drainage channel. (Vol. VI, p. 3593.)

The improvement of the channels of the South Branch and the West Fork was laid out so that the current would not be more than 1¼ miles per hour, except at bridge openings, where there was some contraction. Until 1902, as Chief Engineer, I conformed fairly well to the limitations placed upon the permit of May 8, 1899. In 1902 considerable improvements were made in Chicago river, South Branch and West Fork, to create a greater cross-section. (Vol VI, p. 3594.)

Further and later evidence relating to the works of the Sanitary District, introduced April 25 and 26, 1923, and in connection with motion of defendant filed July 12, 1920. (Rec. Vol. VIII, pp. 175-223; This Narrative, p. 339-383.)

An ordinance of the Board of Trustees of the Sanitary District of Chicago, passed and approved August 7, 1919,
201 Pearse Exhibit 1, April 25, 1923, as follows:

"An ordinance of the Board of Trustees of the Sanitary District of Chicago laying out and adopting a program for the construction and operation of works for the purification of or the removal of solids and organic and inorganic matter from sewage, trade waste, offal and other organic and inorganic matter so that within the period of the next twenty-five years not more than fifty per cent of the amount of said sewage and waste that is now passing into the Des Plaines River from the main channel of the Sanitary District will at the end of such period find its way into said river. Such works are to supplement those constructed or in process of construction for the diversion of sewage and drainage arising within the limits of the Sanitary District of Chicago.

Whereas, the Sanitary District of Chicago was organized and now exists under an Act of the General Assem-
202 bly passed on May 29, 1889, in force July 1, 1889, entitled, "An Act to Create Sanitary Districts and to Remove Obstructions in the Illinois and Des Plaines Rivers," and Acts amendatory thereof or supplementary thereto; and,

Whereas, The said Act of the General Assembly provided for the construction and operation of the Main

Channel of the Sanitary District, including adjuncts and additions thereto whereby the sewage and drainage of the City of Chicago and its environs should be diverted from Lake Michigan to the Des Plaines river, together with a certain amount of water from Lake Michigan fixed according to the population of the District as it might exist when such Main Channel should be constructed and as the population might thereafter increase, to-wit: Twenty thousand cubic feet of water per minute for each one hundred thousand of the population; and the Board of Trustees of The Sanitary District of Chicago is directed by said Act of the General Assembly to operate said works specified with such diversion of water; and,

Whereas, Said Act of the General Assembly was passed and the works provided therein to be constructed were built in order to relieve the people of Chicago and environs of a serious menace to their health and lives arising by virtue of the pollution of Lake Michigan, the only water supply of Chicago by sewage passing into same by way of the Chicago and Calumet rivers and by way of sewers debauching directly into the lake at various points along Chicago's water front; and the said works were intended also to relieve the Des Plaines and Illinois rivers of a serious condition of pollution due to a certain amount sewage and wastes of Chicago and environs passing into said river through the Illinois and Michigan Canal; and,

Whereas, The death rate per year from typhoid fever prior to the operation of the Main Channel of the Sanitary District at times equalled one hundred nintey per one hundred thousand of the population of Chicago, and its environs, which required the immediate construction and operation of works to relieve such condition; and,

Whereas, Immediately after the passage of said Act of the General Assembly of May 29, 1889, the Sanitary District was organized and thereafter commenced the construction of the Main Channel of the Sanitary District, extending from Robey street and the West Fork of the South Branch of the Chicago river to the Des Plaines river near Lockport, Illinois, a distance of thirty-two miles; and the work of constructing said Main Channel was carried forward with due speed until January 17, 1900, when the said Main Channel was placed in operation pursuant to the permit of the Governor of Illinois, in accordance with said Act, and the permit and consent of the Secretary of War of the United States; and the said

Main Channel of the Sanitary District cost the people of Chicago and its environs many million dollars; and there was required for such construction the use of all the money that could be raised by the Sanitary District for taxation and by the issuance of bonds; and,

Whereas, The Sanitary District was compelled to con-
203 struct and place in operation many adjuncts and addition to the Main Channel of the Sanitary District in order that the said Main Channel might accomplish the purpose for which it was constructed and there would thereby be constructed and placed in operation a complete and comprehensive system for a diversion of the sewage and drainage arising within the limits of the Sanitary District from Lake Michigan to the Des Plaines river; and such works included the intercepting sewers and pumping stations on the North Shore and South Shore of Chicago, the Calumet-Sag Channel, with its intercepting sewers, the enlargement of the flowage channel of the South Branch of the Chicago river and the West Fork of said South Branch, and the replacing of many old center-pier bridges with bascule bridges of modern type, and they included also many other works of similar character; and the construction of such works has largely engaged the resources of the Sanitary District, and

Whereas, the Works so constructed and placed in operation have caused a decrease in the death rate from typhoid fever per year in the City of Chicago and environs from an average rate of over seventy-five per one hundred thousand of the population for the ten years immediately preceding the opening of the drainage channel, so that now the death rate from typhoid fever is less than one-half of one per one hundred thousand of population; and,

Whereas, The Board of Trustees of the Sanitary District has recognized that by reason of various conditions existing, such as trade wastes and other materials passing into its channels and the inability to obtain at all points the necessary amount of water to dilute the sewage, thus causing local nuisances, that works should be constructed and operated to remove a material portion of organic and inorganic matter from human sewage, and also to remove and eliminate a material portion of trade wastes and other materials so that the amount of organic and inorganic matter in sewage and the amount of trade wastes and other materials passing through the Main Channel of the Sanitary District into the Des

Plaines river would be materially diminished; and The Sanitary District of Chicago has for such purposes carried on experiments and investigations to ascertain the best method to accomplish such results; and it has constructed at Morton Grove, Illinois, an Imhoff tank for the removal of a certain portion of the solids from the sewage of the Town of Morton Grove, and is constructing in connection with such Imhoff tank a sprinkling filter to further purify the sewage of said town; and the Sanitary District is constructing an activated sludge plant with necessary intercepting sewers for the collection and purification of the sewage of the Towns of Riverside, Maywood, River Forest and others, the sewage of which towns is now passing into the Des Plaines river; and the Sanitary District has authorized the condemnation of one hundred acres of land near the Calumet sewage pumping station at 125th Street and Michigan avenue, Chicago upon which site there is to be constructed an artificial sewage disposal plant for the removal of organic and inorganic matter from human sewage and wastes that
204 may pass into the Calumet intercepting sewer; and the Sanitary District of Chicago has, in the Stock Yards District, to take care of the trade wastes of Packingtown, acquired a site for purification works to be constructed thereon to remove trade wastes and organic and inorganic matters from human sewage now finding their way from that locality to the Main Channel of the Sanitary District; and the South Park Improvement Project provides for the setting aside of sufficient land for the construction of purification works for the sewage and wastes collected at 39th Street and Lake Michigan by the intercepting sewers converging at that point, which intercepting sewers serve a population of approximately five hundred thousand people, and,

Whereas, The Chief Engineer of The Sanitary District of Chicago has made investigation of the amount of trade wastes and other wastes requiring pure water to oxidize same, now being discharged through the Main Channel of the Sanitary District into the Des Plaines river, and the Chief Engineer has found and the Board of Trustees of the Sanitary District believes that the amount of such wastes is approximately equal, if it does not exceed, the amount of human sewage now passing into said Main Channel and through same to the Des Plaines river; and that there is required to oxidize said wastes and render same innocuous and nonputrescible, as much or more water from Lake Michigan than is required to oxidize and

render innocuous and nonputrescible the human sewage of the present population within the territorial limits of The Sanitary District of Chicago; and by reason of such wastes passing into said channel and thereby into the Des Plaines river, the works of the Sanitary District do not fully accomplish the purpose designed and nuisances are created at various places, which nuisances should be abated; and,

Whereas, It is the recommendation of the Chief Engineer of the Sanitary District that works should be constructed and operated to supplement the diversion works of the Sanitary District constructed or in process of construction whereby the amount of human sewage and the amount of trade wastes and other material should be continuously diminished from year to year so that at the end of a period of twenty-five years at least only one-half of the amount of sewage, including all wastes that is now passing into the Des Plaines river from the Main Channel of the Sanitary District shall enter same by way of said Main Channel; and the Board of Trustees of the Sanitary District believes that within the period of four years works of such character can be constructed and placed in operation to materially diminish the amount of such sewage and wastes passing into the said Des Plaines river, as aforesaid; now, therefore be it ordained by the Board of Trustees of the Sanitary District of Chicago:

Section 1. To supplement the works of The Sanitary District of Chicago now constructed or in the process of construction for the diversion of sewage or drainage, and to aid said works in better accomplishing the purpose for which they were constructed, the Sanitary District does hereby lay out and adopt a program for the
205 construction and operation of works for the purification of sewage or the removal of organic or inorganic matter from human sewage and the removal of trade wastes and other wastes and for the carrying on of such work at such a rate as continuously after the lapse of four years to diminish the amount of sewage including all wastes passing into the Des Plaines river by way of the Main Channel of The Sanitary District of Chicago, so that within the period of twenty-five years such purification works shall be constructed and in operation, that the amount of such raw sewage and wastes so passing into said Des Plaines River shall be at least fifty per cent less than that passing now.

Sec. 2. The Chief Engineer and the Attorney of the Sanitary District are hereby directed to take such steps

as may be necessary to carry forward the foregoing program, and the Chief Engineer is directed to report to such officers of the United States and the State of Illinois as may be interested, the progress made from time to time in carrying out said program.

Sec. 3. The foregoing preamble to this ordinance is hereby adopted and made a part of same.

Sec. 4. This ordinance shall be in full force and effect
206 from and after its passage and adoption.

An ordinance of the Board of Trustees of the Sanitary District of Chicago, passed and approved July 8, 1920, Pearse Exhibit 2, April 25, 1923, appearing as Exhibit to motion, (This Narrative P. 111).

Letter of the Division Engineer at Chicago, U. S. Army, to the Chief of Engineers, dated May 24, 1921, Pearse Exhibit 3, April 25, 1923, as follows:

"PEARSE EXHIBIT 3

May 24, 1921.

209 The Division Engineer; the Chief Engineers, U. S. Army, Washington, D. C.:

Cooperation with the Trustees of the Sanitary District of Chicago in Making a Study of Sewage Purification:

1. Referring to the letter of the Chief of Engineers dated March 25, 1920 (E. D. 28918), instructing me to cooperate with the Trustees of the Sanitary District of Chicago in making a study of sewage purification, I desire to submit the following report of progress:

2. The history of the controversy between the United States and the Sanitary District may be briefly reviewed as follows:

Under a permit issued by the Secretary of War on December 5, 1901, the Sanitary District was authorized to divert through the drainage canal a maximum of 4,167 second feet of water from Lake Michigan for sanitary purposes. Since the permit was granted the Board of Trustees of the Sanitary District has made repeated applications for permission to increase the flow, which requests have consistently been denied by the Secretary of

War on the grounds that the permit already issued is of a temporary nature only and that congressional authority is necessary for any permanent diversion. In 1907 the Board of Trustees made application for authority to construct the Calumet-Sag Channel to connect the Calumet River with the main Drainage Canal, and to draw through it 4,000 second feet in addition to the 4,167 second feet previously authorized for the Chicago River. This application was denied, and the Board of Trustees thereupon declared its intention of proceeding with the proposed work and withdrawing from Lake Michigan the additional 4,000 second feet without the sanction of the Secretary of War, unless prevented by injunction proceedings.

3. A suit was then instituted in March 1908, by the Attorney General of the United States to restrain the Sanitary District from reversing the flow of the Calumet River and from withdrawing water from Lake Michigan in any other manner and in any greater quantity than that authorized by the Secretary of War.

4. Being thus stopped by court action from proceedings with its Calumet program, the Board of Trustees in 1910 applied for authority to construct the Calumet-Sag Channel so as to carry the present flow through the two drainage canals instead of only one. In response to this application the Department on June 30, 1910, modified the existing authority so as to allow the previously
210 authorized flow of 4,167 second feet to reach the main Drainage Canal through the Calumet-Sag Channel as well as through the Chicago River, provided, however, that the total amount withdrawn through the two outlets, should not exceed the 4,167 second feet already authorized to be withdrawn through the Chicago River alone.

5. However, the Board of Trustees was not satisfied with this limitation, and in 1912 made application for authority to withdraw through the two rivers, the Chicago and Calumet, a total of 10,000 second feet. After a public hearing this application was denied by the Secretary of War on January 8, 1913. As the Board refused to accept this decision, the Attorney General filed another bill in October, 1913. This suit was combined with the one filed in 1908, but on account of the war and other reasons no decision was rendered by the court until June 19, 1920. On that date Judge Landis rendered an 'oral opinion' in which he held that the 8,500 second feet, more

or less, which the Sanitary District was now diverting from Lake Michigan, had resulted in a lowering of the lake levels, and an impairment of the navigable capacity of all of the Great Lakes except Lake Superior; and that said diversion was not necessary 'for the salvation of this community,' He directed the attorneys for the two sides to get together and prepare for his signature an order sustaining the contentions of the plaintiff, to be effective 60 days after the meeting of the Supreme Court in October.

6. Instead of that, Judge Landis, in August, 1920, in the presence of the District Attorney and myself, heard the Sanitary District Attorney, Mr. Adcock, argue that the Judge should modify his oral opinion so as to allow a total flow of 10,000 second feet. As the arguments were not finished that day the hearing was adjourned to be concluded at his summer home at Trout Lake, Mich., on some day which was to be arranged later. On account of the sickness of the Judge's brother the adjourned meeting, which had been set for the latter part of August was again postponed and has not been taken up since.

7. Ignoring all questions except that of the proper reduction and disposal of Chicago sewage, by the existing method, it is apparent, from many considerations that an excessive amount of water from Lake Michigan is not being used. Contamination of the Illinois River is proceeding rapidly down stream toward Peoria; parts of the Chicago River and its branches show a state of contamination which is all too apparent to the eye and to the nose. It is easy to believe that if, under present conditions of sewage disposal, the amount of water from Lake Michigan is suddenly curtailed, the health of Chicago might be threatened. It is apparent therefore, that if the amount of water diverted from Lake Michigan is not to increase proportionately with the increase of population in Chicago and if health conditions in Chicago are to remain normal, there must be treatment of Chicago sewage. In 1919, with these facts in mind I took up with the Trustees of the Sanitary District the question of adopting an effective program for sewage disposal. As a result, a program was adopted on August 7, 1919, which contemplated that during the following four years
211 there should be accomplished such work of land acquisition, planning, financing and actual construction as would result in a continuous reduction thereafter of the raw sewage entering the drainage canal. The program

further provided that by the expiration of twenty-five years from the date of the program the work of purification shall have been so far advanced that the amount of raw sewage entering the Drainage Canal shall equal not more than one-half of that entering now, and this reduction must occur notwithstanding the fact that at the expiration of twenty-five years the amount of raw sewage produced in the district may be almost double that now originating there. Thus by the end of the twenty-five years period the Sanitary District might be required to treat some fifty per cent more raw sewage than that now enters the Drainage Canal. The cost of carrying out this program was roughly estimated at $140,000,000.

8. The Sanitary District has had studies made by Mr. Francis C. Shenehon, a competent hydraulic engineer, for regulating and compensating works in the Niagara River and at the Galops Rapids in the St. Lawrence below the lower end of Lake Ontario. Mr. Shenehon has prepared preliminary plans and estimates for the works above mentioned. He estimates that regulating works in the Niagara River would cost approximately $1,224,000, and those at the Galops Rapids approximately $1,000,000. It is understood that the Sanitary District, if the engineering propositions of Mr. Shenehon are approved by the United States, proposes to turn over to the latter the amount required for the construction of the works above described, the maintenance and operation of the same to be at the expense of the United States. These works, it may be said, contemplate a diversion of 10,000 cubic feet per second from Lake Michigan to the Drainage Canal. Digests of these two projects as prepared for me by Mr. Shenehon at my request are as follows:

Digest of Niagara Regulation Project

The Niagara River Regulation contemplates slackwater, vessel-draft betterments in Lake Erie, the Detroit River, Lake St. Clair and St. Clair River, Lakes Michigan and Huron and St. Mary's River to the locks at Sault Ste. Marie.

The loss of draft due to a diversion of 10,000 second feet at Chicago is about 5½ inches. In a low water period such as the ten years 1893-1902, the regulation proposed will add over 14 inches to the depth of Lake Erie and Lower Detroit River; over 10 inches to Lake St. Clair,

the Upper Detroit River and the Lower St. Clair River, with proportionate increase in St. Mary's River. In a decade of more plentiful supply, the average betterment is less, because no increase in Lake stage is practicable at flood height. The regulation will compensate for lowerings due to all anticipated diversions at Chicago in the Welland and Erie Canals and in the Niagara River for power purposes, and the regulation is accomplished without danger of riparian damage from flood stages.

The excess flow of May to August inclusive is saved
212 to hold up Lake Erie level during the season of navigation. The Niagara River runs free from January to March inclusive, to avoid flood stages, to give unimpeded passage for ice and to add water for power purposes during the season of ice complications. Water power is the beneficiary of the larger winter flow, which averages 17,000 second feet in January and February, more than off-setting a diversion of 10,000 second feet at Chicago.

During the summer season about 30,000 second feet in addition to the controlled flow would be released during part of each day to furnish mill-pond water for power uses, so that the full natural river flow may pass over the cataracts to preserve scenic grandeur. Regulation of the Niagara has been delayed by the fear of the people of Buffalo that regulating works would cause ice jams and hold up the vast ice fields which cover the east end of Lake Erie. This objection is met by placing removable vessel-type gates, which are removed in January and replaced in May.

The site chosen for works is at the head of the Niagara River, opposite the old water-works at Buffalo. The River is 1,800 feet wide here with bed limestone bottom. The river channel is divided into two sluice-ways by a submerged concrete wall, three-quarters of a mile long and parallel with the current. This carries a shutter dam to complete the partition and the shutters knock down during the winter. Four gates each equipped with twelve large butterfly valves, close off the American Sluiceway. These gates rest and swing on massive concrete emplacements rising about two feet above the rock bottom. Special devices make the placing and removing of these gates easy. As each inch of added draft in Lake Erie is estimated as having a yearly value, of half a million dollars, the average increase of 13 inches is significant. The far reaching benefits, from Buffalo to Sault Ste. Marie, without works or weirs in the Detroit or St.

Clair Rivers, point this out as a project of great concern. The Niagara and St. Lawrence regulations work hand-in-hand.

Digest of St. Lawrence Regulation Project

The St. Lawrence River Regulation contemplates higher surface levels for Lake Ontario in years when the lake is naturally low, and the avoidance of high stages which might cause riparian damage. This depends on the simple principles of slack-water betterment, utilizing movable regulating gates, which when open leave the full out-flow capacity of the lake undiminished as a safeguard against flood conditions. The aim of the project is not alone to restore the loss of navigable depth due to a diversion of 10,000 second feet at Chicago (5½ inches), but to maintain the lake at the highest practicable safe stage. By the manipulation of the outflow computations show 19½ inches gain for the record low water year 1895; over 21 inches gain for the ten-year period 1893-1902; and over 12 inches betterment for the normal supply period 1907-1916.

The lower limit of slack-water betterment is at the
213 Galops Rapids below Ogdensburg, New York. Navigation betterment below these rapids is secured by impounding in Lake Ontario the excess supply of the flood months March, April, May and June, and holding this reservoired water for release in the fall months August to November, inclusive. It is found that, while Chicago takes away 10,000 second feet, this is replaced by 9,000 second feet of impounded water in September, 16,000 second feet in October and 20,000 second feet in November. The lower St. Lawrence is dependent for good volume of flow on Lake Ontario water only in these fall months. The Ottawa River entering the St. Lawrence at Montreal has a May flow of 150,000 second feet dwindling to perhaps 20,000 second feet in September, October and November.

Budgeting Lake Ontario water aids water-power by greater uniformity of flow. The attenuated January-February flow is diminished by 10,000 second feet for Chicago, and 17,000 second feet of impounded water more than restores the loss.

The two channels of the Galops Rapids are natural Sluiceways controlling the outflow of Lake Ontario. The Canadian Channel will remain unobstructed. The non-navigable American Channel, carrying 43 per cent of the

outflow, will be throttled by 1,020 feet in length of regulating works. The bottom is bed limestone, probably overlain in part of glacial drift. The works are placed at the head of this channel. The gates consist of wickets, dropped from five 200-foot span steel bridge platforms. Some increase in outflow capacity of the American Channel is recommended.

9. The special Board of Waterway from Lockport, Ill., to the Mouth of the Illinois River, etc., reported that it would require $150,000 to build works in the Niagara River and $325,000 for works in the St. Clair River to compensate in Lakes Michigan, Huron and Erie for a lowering of their levels due to the diversion of 10,000 second feet, with $15,000 annually for maintenance.

10. The Sanitary Trustees are very anxious to have a determination at this time of the amount of water the United States will permit to be diverted from the Lake. It seems to be admitted now by all concerned that this matter should be settled by Act of Congress. For example, see page 6, House Doc. 762, 63d Cong., 2d Session, from which the following is quoted:

'Further the Board believes that the total volume of water to be diverted from the natural discharge channels of the Lakes should be definitely fixed by Congress; that a project with estimate of cost for works necessary to compensate for such diversion should be prepared to the satisfaction of the Chief of Engineers and the Secretary of War; that before any diversion is made beyond that at present existing, the State of Illinois, shall transfer to the Secretary of War the funds necessary for such works as given by the approved estimate of cost; that the works shall be built by the United States with the funds so provided; and that the control and maintenance of such works shall be in and at the cost of the United States.'

11. The circumstances that the State of Illinois is now engaged in constructing a navigable link between the
214 Sanitary District Canal and the Illinois River at Utica makes it extremely desirable that an early determination be made of the amount of flow to be authorized permanently from Lake Michigan. Upon the amount of flow so authorized will depend to a large extent the character of the improvements which will be necessary to provide an 8 foot channel in the Illinois River should that depth be authorized by Congress.

12. In the letter from the Chief of Engineers dated March 25, 1920 (E. D. 28918) hereinbefore referred to, I was informed that 'at a conference with representatives of the Chicago Sewage Disposal Commission and the Sanitary District Trustee' (sic), it was agreed that the Trustees of the Drainage Canal and the Sanitary Officers of the State would make a study to ascertain what could be accomplished in regard to sewage purification before the sewage was allowed to enter the Drainage Canal or the Illinois River, and the results of such study communicated to the Chief of Engineers through the District Engineer at Chicago. In this same letter I was instructed to cooperate with the Trustees in their study of the case and to render such assistance as I was able, the study to be made 'with the idea of withdrawing the least amount of water from Lake Michigan which would be necessary for the purpose.'

13. In accordance with the instructions of the Chief of Engineers as contained in his letter of March 25, 1920 above referred to, I have held numerous conferences with the Officials of the Sanitary District with regard to their plans for sewage treatment. During the past year there has been considerable change in the official personnel of the Sanitary District, especially among those actively engaged in formulating plans for their sewage treatment system. Among those are the President Chief Engineer, General Counsel and a number of Trustees, considering these conditions the progress made has been very satisfactory.

14. In regard to the contention of the Sanitary District that it is necessary to divert more than 4,167 cubic feet per second in order to avoid contamination of the City water supply and consequent epidemics, I was empowered in a memorandum of the Secretary of War for the Chief Engineers dated July 21, 1920 to say 'that if Judge Landis' decree is accepted as final, the War Department will issue no permit, since it is without legal power to do so, but will ask no further orders from the Court to enforce the limitation so long as the City of Chicago proceeds with dispatch to prepare plans and put them into process of execution for its sewage system. If the City of Chicago then prepares plans and consents to the War Department having current knowledge of its activity, either by reports to the courts or otherwise, the situation will be under the control of Judge Landis until the whole problem is disposed of. If however, the City

of Chicago proposes to appeal the case and takes no steps pending the appeal to cure the trouble, Colonel Judson should be instructed to make no concessions or promises of any kind.' This memorandum of the Secretary of War was obtained through the Chief of Engineers at my solicitation for use whenever Judge Landis
215 decides to finish the hearing on Attorney Adcock's arguments for allowing a total diversion of 10,000 second feet. In this connection Mr. Adcock was making the argument that the War Department would be arbitrary in acting on the findings of the court, and a statement was desired which would show that the Secretary of War would not be arbitrary in the matter.

15. On January 17, 1921, a formal conference was held betwen Mr. Chas. F. Clyne, United States Attorney, and myself representing the United States and the Trustees of the Sanitary District, their attorneys, Consulting Engineer and Chief Engineer. At this conference attention was invited to the Memorandum of the Secretary of War for the Chief of Engineers dated July 21, 1920, above referred to, copies of which were furnished the Attornevs for the Sanitary District. The Trustees agreed to take under advisement the proposition of the Secretary of War as set forth in his memorandum and to submit an answer thereto at a later date. At this conference an agreement was reached with the Sanitary District authorities that I be furnished with an outline of their present plans for sewage treatment. A copy of the memorandum furnished in accordance with the above agreement giving an outline of the work already completed, that now under way and proposed, and indicating the probable future policy of the Trustees, is enclosed herewith.

16. A second conference was held on February 7, 1921, at which the United States Attorney was represented by his assistant Mr. J. B. Boddie. The proposal of the Secretary of War as embraced in the last paragraph of his memorandum of July 21, 1920 (E. D. 98093/657), was discussed and the Sanitary Trustees stated that they were unable to accept the proposition that Judge Landis' decree be accepted as final. On the other hand they stated that they would proceed diligently in the preparation and execution of plans for the treatment of sewage within the Sanitary District. They stated that since the conference of January 17, 1921, they had prepared their budget and in it had placed some $8,000,000 for sewage treatment operations, and that in subsequent budgets

they would continue to provide for work upon a large scale to carry into effect plans already prepared or now being prepared for sewage treatment. They estimated that depending upon conditions in the labor and material market the entire cost of such treatment would be in excess of $100,000,000 and perhaps as much as $140,000,000 but stated that they were confident that they could provide this sum so that in somewhat less than 25 years they would be able to at least carry out the program adopted August 7, 1919, and perhaps do even better than was proposed in that program.

17. It was understood that the matter before Judge Landis would be proceeded with regardless of the more or less futile negotiations that have been in progress with reference to the proposition of the Secretary of War that the decree of Judge Landis be accepted as final. Mr. Boddie stated that he understood the situation and understood it to be the duty of the United States Attorney's office to proceed with efforts on its part to secure
216 the formulation and entering of the formal decree by Judge Landis, opposing any efforts of the Sanitary District to procure a modification of the decree. It may of course be regarded as a fact that the Sanitary Trustees will appeal from the decree of Judge Landis if it is entered without modification, satisfactory to them.

18. The Chief Engineer of the Sanitary District, at the conference of February 7, 1921, informed me that it was the intention of a committee of Trustees and employes ofthe Sanitary District, including himself, to visit Fort Worth and Houston, Texas, and other localities, at an early date, to inspect activated sludge plants in course of construction or operation and suggested that I accompany them. This I subsequently undertook to do but my travels were interrupted by illness.

19. While the Sanitary District doubtless has authority under existing state laws to proceed with its sewage treatment program, in an excess of caution it has caused bills to be introduced in the State Legislature for explicit authority to construct the proposed sewage treatment works, in accordance with the accompanying memorandum, and the controlling works in the Niagara and St. Lawrence Rivers as well, in accordance with the projects of Mr. Francis C. Shenehon, hereinbefore referred to. These bills are still pending with good prospects that they will be passed.

Opposing interests are also endeavoring to secure legislation to limit the bonding power of the Sanitary District, by requiring that each bond issue be subject to a referendum.

20. In the meantime the Sanitary Trustees are proceeding energetically with their plans for sewage treatment and disposal as outlined in enclosed memorandum. Since the date of their report they have acquired 180 acres of land located on the North Shore Channel as a site for their proposed North Side purification plant.

21. The progress made by the Sanitary District is well illustrated by Exhibits E and F constituting part of enclosure showing their budget appropriation for 1921 and their expenditures during the ten year period 1910-1920. During the last named period the expenditure for sewage treatment works has amounted to approximately $9,400,000. Their budget for 1921 provides $6,500,800 for the completion of old projects and $3,242,500 for new projects.

22. The program of the Sanitary District, if carried out, will insure the practicability of keeping the volume of water diverted from Lake Michigan within limits which it is hoped all concerned will finally deem reasonable.

W. V. Judson, Colonel, Corps of Engineers, Divn. Engr., N. W. Divn. 1 encl."

Langdon Pearse, a witness for the defendant, testified as follows (April 25 and 26, 1923; Rec. Vol. VIII, pp. 176-197): 177 Resides Winnetka, Illinois.

Been employed with The Sanitary District of Chicago in various capacities since March 1st, 1909; at present in the position of Sanitary Engineer, in charge of the sanitary engineering work of the District.

Graduate of Harvard College with the degree of A. B. 1899; and from the Massachusetts Institute of Technology, with a degree of Bachelor of Science in Civil Engineering; also Master of Science in Civil Engineering, of date 1902.

In the period between 1901 and 1909, at which time became connected with the Sanitary District, was successively Level-

man for the Massachusetts Harbor and Land Commission, on the Brockton Ship Canal; Assistant Engineer to the Charles River Dam Commission, under John R. Freeman; Assistant Engineer for the Commission on Additional Water Supply in New York City, known as the Herring-Burr-Freeman Commission; also as Personal Assistant to George C. Whipple in work for the Augusta Water District, Me., Cleveland and Jersey City; and also in connection with the suit of *Missouri* v. *Illinois*.

From there, was Assistant Engineer for the Improved Water and Sewage Works at Columbus, Ohio, involving the construction of a water filtration and softening plant; also sewage treatment; and also Assistant Engineer on the Greater Water Supply for the People's Water Company of Oakland, California, a water filtration project.

From 1909 to date, have been successively assistant engineer, division engineer, and since 1917, sanitary engineer with the Sanitary District of Chicago, in charge of all sanitary work, involving the laboratory work covering chemistry and bacteriology, in connection with our testing stations, studies of the Canal and River, as well as industrial wastes; the construction and operation of four Testing stations, respectively on domestic sewage at 39th Street and the Lake, packinghouse waste, tannery sewage and Corn Products sewage; the design and construction of intercepting sewers in size from six inches to twenty-two feet in diameter, including the North Shore Intercepting Sewer, the Stockyards Intercepting Sewer, the Calumet Intercepting Sewer, and the 52d Avenue Sewer Outlet; the design of sewage pumping stations, known as the Evanston, Des Plaines, Calumet, 95th street stations, and also the remodeling of Lawrence Avenue and 39th Street; the design of sewage treatment works and other construction at Morton Grove, the so-called Calumet works at 125th Street and Cottage Grove Avenue, the Des Plaines River Treatment Works, near the Subway Hospital in Broadview; Glenview Sewage Treatment Works, and the designs for the North Side Sewage Treatment Works.

Have further been in charge of the general operation of the Sewage Treatment Works, of which we now have three in operation, one at Morton Grove, one at Calumet, and one known as the Des Plaines River.

178 In addition to these technical duties, have also been in charge of preparing special reports and data for the use of the Chief Engineer and others in different suits.

In addition to duties with The Sanitary District, have further served as a Consultant for the U. S. Public Health Service on stream pollution for the last three years; and in that connection served for the Sanitary District on a joint survey with the U. S. Public Health Service of the Illinois River, extending over a period of one year.

In private capacity as a Consulting Engineer, have executed the following works, in special partnership with George W. Fuller; designed and built the Evanston Water Filtration plant. As a member of the firm of Pearse, Greeley & Hansen, we designed and built the Decatur, Illinois Dam & Sewage Treatment Works; the Whiting, Indiana Water Filtration plant, and the Winnetka, Illinois, Water Filtration plant.

And further, as engineer, have made reports for, designed and built works forthe Sanitary District of Decatur, the North Shore Sanitary District, the Downers Grove Sanitary District, the Sanitary District of Champaign and Urbana; and in addition have made miscellaneous reports on industrial wastes for the Holland-St. Louis Sugar Company, the Standard Oil Company of Indiana and others.

Am a member of the American Society of Civil Engineers, and the American Institute of Consulting Engineers.

Witness further testified:

I was first employed in 1909, with the intent of making a complete and thorough investigation of the sewage treatment problem of The Sanitary District. I have been at that ever since.

I first went into the engineering details in the so-called 1911 report of Mr. Wisner, who was then Chief Engineer; and later in 1912 and 1914, I went into the matter again in connection with this particular lawsuit for Mr. Wisner. And further in 1919 and 1920, in connection with the report of the so-called Expert Commission composed of Eddy, Fuller and Hatton.

It was early evident that to unravel the sewage treatment problem, a close study was required, not only of the sewage from the human sources, but also of the wastes of industrial origin.

The study of the domestic sewage was begun by a testing station at 39th Street and the Lake, operating on sewage coming from an area of over twenty-two square miles, and from a population of 270,000 and up. This was very free from industrial wastes. In this Station were tried all the practical methods of sewage treatment then known, including septic tanks, Imhoff tanks, biolytic tanks, sprinkling filters, etc.

The difference between the different tanks mentioned is essentially one of construction as well as operation. By
179 septic tanks, I mean the single story tank in which the solids deposited from the sewage are allowed to accumulate, with cleaning at infrequent intervals.

By the Imhoff tank, I mean a double deck type of tank in which the upper chamber serves as a settling chamber, the solids passing through a trap into the lower chamber where they digest at leisure, the gases passing off through a separate vent, in order not to contaminate the sewage flowing through, which is settling.

The sludge from this tank may be drawn at intervals of two weeks, in the warm weather; the storage capacity provided being from four to six months, according to the design.

The biolytic tank is a special device, in which all the sewage entering the tank comes in at the bottom and passes through the sludge deposit. This tank has been used only experi-

mentally, and while it gave a remarkable reduction of sludge, it produced offensive odors and was therefore discontinued.

The sprinkling filters mentioned are beds of crushed stone, in the experimental work ranging from five to ten feet in depth, but usually in active work around six feet and a half, the stone being composed of one and a half to two inches in size. These beds are placed upon prepared underdrains to permit free drainage of the liquid trickling down through. The liquid is sprinkled upon the surface by nozzles spaced up 13½ feet on centers, operating intermittently and dosing the beds at a rate of from two to five million gallons per acre per twenty-four hours.

The 39th Street Testing Station was operated from October, 1909, to January, 1915. The results that were obtained there indicated that with the more dilute sewage found in Chicago, liberal provision for treatment, loadings, was required.

The value of the Imhoff tanks and sprinkling filters was clearly demonstrated.

Following the study of the domestic sewage, we entered upon an extended study of the Packingtown situation in January, 1911. The preliminary investigation showed the lack of knowledge for handling such waste. Consequently a Testing Station was established in 1912, and operated until September, 1918. These studies showed that the activated sludge process was the most promising of success on Packinghouse waste.

I might explain that the activated sludge process is a process in which the solids settling from the sewage are held back and conditioned by the blowing of air, so that in a period of about two weeks it has acquired the property of changing from the organic matter coming in the sewage to a more mineral form. It is essentially a biological process, involving the same principles as in the sprinkling filter, except that the films which are active and doing the work are held in suspension by air blown in at the bottom of the tanks, in

stead of the films being around the periphery of the stones in a bed above ground. The sludge is retained by settling tanks, returned to the incoming sewage and then held in contact and in thorough mixture by the air blown in 180 at the bottom of the tanks.

From day to day a certain amount of sludge can be removed from the system, about one thousand pounds per million gallons of domestic sewage, and in the case of Packingtown about between three and four thousand pounds of dry solids per million gallons.

This sludge is higher in nitrogen than the usual sludge from Imhoff tanks or other processes.

In connection with our packinghouse investigation, a thorough inspection was made of every packinghouse in the Sanitary District, the flow from each being gaged and analyzed before entering the sewer.

In 1911, all the packinghouses were examined. In 1917, the work was repeated, the flow of thirty-one houses being measured and analyzed in a period of about three months.

The study of the tannery situation was begun in 1912. A recent investigation showed twenty houses all located on the north branch of the Chicago River. After a number of inspections, a tannery testing station was established in December, 1919, and operated up to December 31, 1922. In this the various processes applicable to handling tannery wastes were tried, including sprinkling filters and activated sludge. A survey of the industry was also made, house by house.

The Corn Products Refining Company plant at Argo was early recognized as an outstanding source of organic pollution. After some preliminary work, a testing station was established in 1921, by which the experiments have been conducted to date, using activated sludge and also a sprinkling filter. The flow of the plant has been measured, analyzed and correlated to the grind. This plant manufactures primarily starch and glucose, and is the largest of its kind in

the world, grinding upwards of 75,000 bushels of corn every twenty-four hours.

There are other sources of pollution, which we have investigated in a cursory way, which add to the load, but are not so important as those listed. Among these may be mentioned the Pope Beet Sugar factory, miscellaneous butterine factories, paint and glue works, gas works, paper mills and wire mills.

The study I have made in the last fourteen years has led me to divide the Sanitary District into five main geographical projects, namely:

The Calumet, south of 87th street.

The Southwest, south of the canal and the river and north of 87th street.

The West, north of the canal and river, and south of Ful-
181 lerton avenue in general, and the

North Side Project, north of Fullerton avenue.

In addition, there is the Des Plaines River Project.

Besides these five main projects, there are the Packingtown, Corn Products and Tannery Industrial Projects. The first two require separate treatment plants distinct from the human sewage plants, whereas the tannery situation is to be combined with the North and West Side Projects.

Besides the major projects outlined, there are and will be for many years small treatment units, plants for isolated villages such as Morton Grove, Glenview, Shermerville and the like, where the population is small and the distances are too great to warrant the construction of an intercepting sewer at present.

I have made a careful study of the population in the Sanitary District from the United States census figures from the component parts of the census of 1890, 1900, 1910 and 1920. From the figures an estimate has been made of the future population of the District up to 1960. The growth of the various sewage treatment project areas has also been worked out in detail.

We have plotted the populations as they have existed, with the correction for the date, on paper, and then projected a curve on that.

We have further tested the ten-year increment by the actual differences, taking into account the growth of the territory of the Sanitary District, and have arrived at the figures given in the table.

This method has been used and is one that is usual among engineers.

Pearse Exhibit 4 as follows:

The Sanitary District of Chicago

217 Population and Area

Year	Population	Area	Date of census
1890	1,149,758	185.0	June 1
1900	1,775,882	185.0	June 1
1910	2,311,810	358.1	Apr. 15
1919	2,940,906*	388.14*	.....
1920	2,986,000	395.51	Jan. 1
1921	3,071,000	.....	.....
1922	3,142,000	437.39	.....

* In June, prior to annexation of Salt Creek Villages.

181 Table for the years 1920, 1930, 1940, 1945, 1950, 1955 and 1960, as Pearse Exhibit 5, April 25, 1923, is as follows:

The Sanitary District of Chicago

217 Population in Various Sewerage Districts

Locations	1920	1930	1940	1950	1960
North Side Treatment Plant	590,000	800,000	1,615,000	1,230,000	1,450,000
West Middle Plant Incl. Loop	1,300,000	1,420,000	1,550,000	1,680,000	1,800,000
S. W. Treatment	850,000	1,040,000	1,230,000	1,415,000	1,600,000
Calumet	160,000	225,000	290,000	350,000	415,000
Miscellaneous	100,000	215,000	340,000	465,000	595,000
S. D. C. Total	3,000,000	3,710,000	4,425,000	5,140,000	5,860,000

Dec. 31, 1921.

182 These loads are shown in the table which I have prepared based on the census populations nad the projected population for the human load, and based upon our surveys for the industrial load expressed in equivalent population.

Table shown as Pearse Exhibit 6 as follows:

The Sanitary District of Chicago

217 Population Estimates

Year	Human	Industrial equivalent	Total
1920	3,000,000†	1,500,000	4,500,000
1930	3,710,000	1,700,000	5,410,000
1940	4,425,000	1,900,000	6,325,000
1945	4,782,000	2,000,000	6,782,000
1950	5,140,000	2,100,000	7,240,000
1955	5,500,000	2,200,000	7,700,000
1960	5,860,000	2,300,000	8,160,000

† Based on 1920 Census.

182 The estimates for the years following 1930, and up are given in the Exhibit 6, following the figures given for 1920, for the totals there expressed.

The method by which I have arrived at the population equivalent of the industrial wastes is based on the dissolved oxygen required to oxidize the putrescible matter in sewage. Continued research over many years in the laboratory of the Sanitary District has shown this to be a reliable and accurate measure of the strength of sewage, inasmuch as it utilizes exactly the same biological activities which are effective in the stream. By stream I mean the Canal, Des Plaines and Illinois Rivers.

Essentially, the test depends on mixing with the sample sufficient standard water saturated with dissolved oxygen to supply enough dissolved oxygen to oxidize the organic or putrescible material, in five, ten or twenty days, as the case may be, and leave a small amount of oxygen over at the end of a period.

The amount of dissolved oxygen required is expressed in parts per million. For purposes of comparison, a ten-day period has been chosen in our work, inasmuch as 90 per cent of the oxidation of the putrescible material is generally completed in sewage within that period. Such a test is called the Biochemical oxygen demand, and has been widely used by the U. S. Public Health Service, the Sanitary District and other research workers, as being more delicate and expressive than the old line chemical determinations. In some instances we have used nitrate of soda, added in known amounts, in place of dissolved oxygen.

The first step in the study of our sewage was to determine the amount of dissolved oxygen required per capita to oxidize the putrescible matter in human sewage. Prior to the work of the Sanitary District this figure had never been determined. Experiments were made on the sewage at 39th 183 Street Pumping Station during the year 1914. This sewage was chosen because a thorough inspection of the area tributary showed no industrial wastes likely to upset the tests.

On 179 days, hourly portions were collected during the twenty-four hours and daily composites were made. These were analyzed. The flow of the sewage was measured. The population tributary was estimated. From the data the average figure was determined that 100 grams of oxygen are required per capita to properly oxidize the human sewage, or 0.22 pounds. Subsequently other research chemists confirmed this figure to me personally.

The next step was to determine the amount of putrescible material requiring oxidation from the different industries. This was done from time to time as follows:

The Packingtown and Union Stock Yards situation was investigated in the summer of 1917 between July 9 and October 6. At that time thirty firms were actively engaged in the packing and allied industries, in addition to the Stockyards. All of these houses were examined, and the flow gaged

and analyzed from forty-one outlets, besides the public sewers, and certain outlets from the Stockyards. In all cases (except three of the smaller houses where the examination lasted two days) the sampling and gaging continued a week, night as well as day.

The flow was read as frequently as every ten minutes in most cases. For analysis, individual portions were taken every ten minutes and combined into hourly composites, which in turn were combined into day or night composites, weighted according to the flow. I mentioned the fact we made day and night composites, bacause there was a marked difference in the flow, in the strength day and night, as well as in the quantity.

From the determination of the biological oxygen demand and the flow, the total oxygen requirement was calculated. Based on the 0.22 pound per capita, the effect of the Stockyards and Packingtown was found to be practically 1,000,000 people. This investigation alone cost $5,661.97, an amount which was reimbursed to the Sanitary District by the packers.

For the Tannery industry, the investigations made between 1911 and 1919, gave a rough indication of the equivalent. However, the most detailed survey was made in the summer of 1921, when twenty tanning houses were inspected. For each house, the flow was gaged and analyzed, the work being done substantially in the same manner as for the Packing-house survey. The determination of the biological oxygen demand and the flow from the houses showed a total oxygen requirement equivalent to 70,000 people, on a normal hides capacity rating. In addition, seven wool pulleries and three wool scouring houses were examined.

For the Corn Products Refining Company, the investigations were made in December, 1921, and January and February, 1922, in connection with the testing station then operated on the Corn Products wastes. The flow was gaged and sampled throughout the twenty-four hours, analyses being made on twenty-four composites. The resulting oxygen

demand showed that the population equivalent was 411,000 people, at that time when a grind of 64,500 bushels was being made. Since that time the grind has increased.

The Sanitary District Channel in the main section was designed upon the assumption that the runoff of the Chicago River would not exceed 10,000 cubic feet per second, and could therefore be diverted from the lake by a channel having that hydraulic capacity.

If the diversion from the lake is limited to 4,167 cubic feet per second, the likelihood of overflow into the lake is very much increased, with a result that pollution of the water supply is likely to occur, which will be severe. This is due to the fact that the intercepting sewers as designed cannot be made large enough to carry more than twice the dry flow in 1950; hence overflows will come into service, at times of storm, spilling sewage into the branches of the Chicago River. Consequently, with any reversal of the flow, storm water and sewage mixed will fill the river and be swept into the lake.

It does not seem safe to me to rely entirely upon chlorination of the water supply for protection, where water would be exposed to sudden and so-called explosive pollution. In my experience, the only adequate and certain protection would be filtration, accompanied by chlorination, as a finishing process.

I have prepared an estimate of the use of water at the present time in the City of Chicago, that is as of 1920; and also for 1945 and 1955. These estimates have been checked with those of the Water Bureau of the City of Chicago, and are in substantial agreement. That is practically the pumping. That has nothing to do with the diversion from the lake by the Sanitary District.

Table of water consumption for 1920, 1945 and 1955,
218 Pearse Exhibit 7, April 25, 1923, is as follows:

Year	Population	Mil. gal. per 24 hr.	Gal. per cap. per 24 hr.	Max. Rate mil. gal. per 24 hr.
1920	2,700,190	715	265	945
1945	3,919,275	1,355	346	1,800
1955	4,406,909	1,610	365	2,130

185 I have made a rough estimate of the cost of filtration, basing the capacity of the plant on the maximum daily rate, and including in round figures the low lift pumping stations.

In 1945, the cost would be for construction approximately $90,000,000, or by 1955, a cost of $106,500,000. These costs are in round figures and undoubtedly would require some additional expansions to increase the figures in a detailed survey, because of the necessity of the connections to the intake tunnels and other incidental work, which at present it is difficult to estimate. I present them as an indication of figures based on the cost of works in the past and present, to show the magnitude of the filtration expenditure.

The estimate may be within fifteen or twenty per cent, based on round figures, calculated per million gallons for plants of like nature. They are figures that perhaps are not accurate enough to predicate a bond issue upon for a public vote, but are accurate enough to indicate the magnitude of the expenditure for handling the filtration of a city of the size of Chicago. Such a plant would be the largest filtration plant of its kind in the world, and would necessitate special designs and lay-out, so that the figures necessarily at the present moment are not contractors' estimates of what the work could actually be built for, but they are what we call preliminary estimates which may be accurate within fifteen or twenty per cent, thereabouts.

I believe that in 1945, the cost of maintaining and operating such filter plants for the city would exceed three million

dollars, and that by 1955, the cost would have probably reached $3,526,000, the additional cost being due to the additional service required for the population, and increased pumpage.

To these figures necessarily should be added interest charges and depreciation, to give the total annual costs. These costs cover labor, chemicals, supplies and general repairs necessary and incidental to the operation of such filtration plants.

I have made a calculation based on the plan outlined by the ordinance of August 7, 1919, the so-called "Colonel Judson plan." This was designed to outline the program for the Sanitary District for the twenty-five years following 1920, to construct works which would reduce the load on the channel to one-half that existing in 1920. The figures are 186 presented as follows:

For Conditions in 1920.

By census, S. D. C. in 1920	2,986,000
Estimated Industrial Wastes	1,500,000
Total	4,486,000
One-half	2,243,000

Equivalent population expressed in the equivalent sewage from human beings. That is, that represents, according to such estimates, half the waste passing from the southern terminus of the Main Channel of the Desplaines River. The figure of 2,243,000 is in round figures to the nearest thousand.

The equivalent population, under the Colonel Judson plan that would be required to reduce the sewage pollution to in 1945, outlined in 1945, the conditions are as follows:

For Conditions in 1945.

Estimated S. D. C. in 1945	4,782,000
Estimated Industrial Wastes	2,000,000
Total	6,872,000
Deduct residual one-half	2,243,000
Requiring treatment by	4,539,000

Four million five hundred thirty-nine thousand is the population which I understand would have to be provided for by treatment works, under this so-called Colonel Judson plan.

That is, during the period from 1920 to 1945. I have based the figures on the minimum legal dilution expressed in the Act of the Sanitary District, namely 3⅓ cubic feet per second per thousand population, and on that base I find the population of 2,243,000 requires 7,500 cubic feet per second, in round figures for dilution. From the sewers there may come a flow which we have assumed to be 346 gallons per capita per twenty-four hours for a population of 4,782,000 in 1945, which would give a flow of 2,482 cubic feet per second, making a total flow through the channel of diversion from the lake, and of water supply coming through the sewers of practically 10,000 second feet; a difference of only a few unit second feet, so that it rounds out to the 10,000 second feet.

187 On the assumed basis of the minimum legal dilution 4,617 cubic feet per second, at 3½ cubic feet per second per thousand population, is equivalent to 1,250,000 people. In 1945, the total population equivalent, both human and industrial is estimated at 6,782,000. The difference, or 5,532,000 people would require treatment. In 1945, this means 993,000 more people than would be required under the Colonel Judson plan.

188 It would take, probably, to build these additional works for the 993,000 people not over ten years. The human population would amount to 5,500,000 in 1955 and the industrial wastes 2,200,000, making a total of 7,700,000. The figures given previously may be developed as follows: The total population in 1955 we have estimated at 7,700,000; the total population in 1945, at 6,782,000, making a difference of 918,000 population, as the growth in the ten years.

If you take the total in 1955, namely 7,700,000 and from this deduct the population equivalent to the 4,167 cubic feet per second, namely 1,250,000, you have as a difference as of 1955 a population of 6,450,000.

Under the Colonel Judson plan as mentioned before, the population requiring treatment in 1955 would be 5,457,000, the difference then between the two being 993,000 people.

We have made an estimate of the cost. The sewage treatment program based on this plan (August 7, 1919 ordinance) was estimated in 1920, to require directly an expenditure for sewage treatment of $104,335,000, out of a total program of over $106,000,000. I say over $106,000,000 because in addition to the $104,000,000 would be the other items such as regulating works, bridges over the Main Channel, and dredging of the Calumet River, which amount to $7,250,000. Of the 189 total as estimated, over $9,490,000 has been spent or put under contract to date, thus leaving a total of about $94,845,000 still to be expended. The amount of approximately $9,000,000 has been either expended or contracted for since 1920.

Estimated cost of sewage treatment projects and necessary construction work 1922-1945, as Pearse Exhibit 1, April 26. 1923, is as follows:

The Sanitary District of Chicago

Estimated Costs of Sewage Treatment Projects and Necessary Construction Work for Period 1922-1945

Work under contract and completed project	Contract liability	Date of completion
Calumet Treatment Plant	$2,200,000	1922
218 " Mach. & Adm. Bldg.	520,000	1923
" Sewers—Contract #10	130,000	1922
" " " #11	2,300,000	1923
Desplaines Treatment Plant	300,000	1922
Oak Park Sewer	500,000	1922
39th St. Conduit Extension	2,000,000	1924
Calumet-Sag Channel	200,000	1922
North Side Sewers—Contract #1	1,610,000	1923

Proposed wokr	Estimated cost	
Calumet Sewers—Contract#1	400,000	1923
Harbor Ave. Sewer	250,000	1924
Extension Blue Island Sewer	425,000	1928
Sewer to Riverdale & Dolton	200,000	1928
Sewer—Burnham, Hegewisch & W. Hammond	500,000	1928
95th St. Pumping Station	1,000,000	1924
Calumet Sag Channel	120,000	1923
Dredging Calumet River	1,000,000	1929
Glenview Treatment Plant	25,000	1922
La Grange Sewer & Treatment Plant	75,000	1923
Oak Forest Sewer	300,000	1923
Extension Desplaines Plant	100,000	1924
California Ave. Bridge	750,000	1924
Elmwood Park Sewer	250,000	1925
Stockyards Treat. Plant (Demonstration)	350,000	1926
" Sewers, Pump. Sta. & Screens	1,000,000	1926
Cicero Ave. Bridge	1,500,000	1926
Remodel Lawrence Ave. Pump Sta.	200,000	1926
219 Broadview Sewers	200,000	1926
Corn Products Treatment Plant..	1,500,000	1927
Regulation Works—Niagara & St. Lawrence	2,500,000	1927
North Side Treatment Plant	13,500,000	1928
" " Sewers (exc. Cont. #1)..	7,800,000	1928
Crawford Ave. Bridge	1,500,000	1928
Harlem Ave. Bridge	1,000,000	1929
Calumet Sp. Filters & Plant	2,000,000	1930
Extention North Side Plant	2,000,000	1931
Stockyards Treatment Plant	6,000,000	1932
Remodeling 39th St. & 73rd St. Pumping Sta.	900,000	1934
West Side Sewers	13,300,000	1940
" " Treat. Plant (Imhoff)	10,900,000	1940
South West Side Sewers	9,400,000	1945
" " " Treat. Plant (Imhoff)	7,200,000	1945
*Misc. Treat. Plants & Sewers	11,200,000	1927-1945

We based this schedule on the following assumptions as to the progress that might be made. I would make this explan a-

tion, however, that this general program was worked up in 1922, that is not 1923, and we estimated then that the North Side work would be started in 1922. The plans were practically ready last fall for the first contract of that plant, but owing to the discussion with Evanston over the location of
the site, the work has not actually been put under con-
190 tract, but the program is outlined to start on the North
side plant in 1922, and completed by 1928.

The District has acquired approximately 200 acres at Oakton avenue and the North Shore Channel for the purpose of a site. This site was acquired about two years ago. Last year, when it was announced that we were prepared to start work on the plant, objections were raised by various Evanstonians, and only to-day a large delegation was in the office before a public hearing of the Trustees, protesting against the use of that site, and alleging possible damage to the property values in Evanston.

The Trustees have indicated as yet no decision in the matter, but have been investigating very seriously the entire question since last October. The change in the board in December re-aligned some of the committees. We expect a decision shortly, and orders to proceed in one way or another on actual construction. The reason for the objection is that Evanston has expressed a desire to annex 2,500 acres west of the Channel, extending out towards the north branch of the Chicago River north of Oakton avenue; and the claim is made that the location of this plant will injure the desirability of that locality for the best class of residential buildings.

I would add this, however, that on this north side project we have already built five miles of sewer from Sheridan Road south to Oakton avenue, so that the northwest line of the intercepting sewer is completed and ready to hook into the pumping station. And we have completed preliminary plans for the work from the south, and have already started on the plans for re-modeling Lawrence avenue, so that the sewage that now passes to the river through the Lawrence avenue

conduit from the Lincoln Park region will be diverted to our interceptor.

The suggestions of Evanston are that we can move the plant five miles or more to the West, which would increase the sewer cost of the project at least a million and a quarter a mile for about four miles anyway, as a minimum. That is five million dollars and this would probably add to the operating expenses approximately $100,000 a year. I have been informed that that land is worth about $1,000 an acre. Our board paid $1,500 an acre for the site of the treatment plant.

In our schedule, we further assume that the Corn Products plant could be started in 1925, and completed in 1927. I purposely allowed three years there for legal conditions, to arrive at an agreement with the Corn Products, because in our experience with the packers, after we had outlined the engineering plans for doing the work, that overcame the engineering objections, we have been approximately four years negotiating as to the legal difficulties; and negotiating to arrive at an agreement under which the work could be prosecuted.

191

For the Stock Yards project, we allowed for a start in 1925, and assumed it would be completed in 1932. In making this allowance, we assumed that legal negotiations would take at least two years; that the design of the sewers and works would be done by 1924, and the construction of the sewers, pumping station, screens, and the first unit of aeration tanks completed in 1926. A year is allowed for the design and contract plans for the entire plant, and a year for necessary legal negotiations. The plant is assumed to go under construction in 1929, and to be completed in 1932.

I would explain this arrangement was made, because when Mr. W. B. Richardson, representing the packers, and myself representing the District brought in a report outlining the engineering method of proceeding, in 1917, we made a recommendation that the work be done by gradual steps, first to construct the sewer, pumping stations and screens for the entire

works. Mr. Richardson differed with me and said we ought to have the screens only for one unit, that is about one thirtieth of the entire flow, and then we both agreed that the activated sludge plant recommended by both of us as to process should be built gradually, in order to demonstrate to the packers on a working scale of at least a million and a half gallons per day, the entire feasibility of the process.

Since that time, I have taken the position that the size of the plant to start might be markedly larger, as we know more of the process to-day, and have been operating a plant at Maywood for over eight months.

The sewage is much stronger at the Stock Yarks, expressed in biological oxygen demand. The sewage in the Stock Yards will run from 500 to 1,000 parts per million, as against 125 to 150, not over 200 in Maywood.

The amount of suspended matter in the Stock Yards will run from 3,000 to 4,000 pounds of dry matter to the million gallons, whereas at Maywood we have 1,000 pounds. In other words, there is three to four times as much solid to be handled.

Further, with the screens at the Stock Yards, we estimate we can take out about 1,000 pounds of dry material to the million gallons, whereas at Maywood we are only taking out 200 pounds a day for 3,000 gallons. That is sixty pounds of wet material with eighty per cent moisture, or sixteen pounds of dry material to the million gallons.

The Stock Yards sewage is one of the strongest sewages in the United States produced on such a scale, and is full of fresh organic mattter, blood, particles of meat, hay straw, and undigested contents of cattle paunches, hogs and other animals.

192 I feel that a reasonable program for handling has been devised, namely to de-water the sludge, which in its original form contains about ninety-nine per cent of water; reduce that to eighty per cent or less by filter process, with the addition of either an acid or a coagulen like sulphate of alumina

and then take the solids with less than eighty per cent of moisture and dry them in a rotary heat drier. They will then be in a form containing ten per cent of moisture, capable of passing through an eight mesh sieve, and suitable for sale in the market as fertilizer. We have been offered by at least two responsible firms the amount of five dollars and ten dollars per ton f. o. b. cars for Chicago for such material, to be used in mixing fertilizer for the Southern market, or for truck farm either in the East or the Ohio Valley.

That has been worked out in the last two years. In addition, the City of Houston has been selling similar material for eight dollars a ton for use in the cotton belt in the South, prepared in much the way that I have indicated. The City of Milwaukee is installing a plant now to handle the sludge in exactly this fashion.

In order to build up a sufficient treatment to meet the requirements of the Colonel Judson program, or a more elaborate program, we have had to plan the construction of the so-called West Side Project, including the sewers, and a plant which, for the purposes of this estimate, we have assumed would be a settling plant to remove all the solids which may settle in the Channel. The construction of this plant has been assumed to begin in 1932 and to be completed in 1940.

Further, for the South West Side, we have laid out a similar program for treatment, including intercepting sewers and a settling plant, the construction to start in 1935 and to be completed in 1945.

Besides the new work which I have mentioned, viz: the North Side, West side and South West Projects, the extension of existing projects will require attention in the life of the program.

The Desplaines River sewage treatment works, which has been in operation since August 1, 1922, will need extensions in 1924, to take care of the increased population.

The Calument treatment works, which has been in operation since October, 1922, will need an extension of the tanks, and

we have assumed an addition of sprinkling filters to produce a higher grade effluent than we were supplying, in the year 1930. We have further allowed for the extension of the North Side treatment works, assuming that they were completed in 1928, in the year 1931.

As originally outlined the program covers an equivalent population of 4,251,000 taking the Imhoff tank treatment
193 as the equivalent of one-third complete treatment. This is within five per cent of the figure set for 1945, as outlined by the Colonel Judson plan. This method of handling was assumed by settling the sewage which was not given complete treatment, in order to retain all the settling solids.

I would explain that the reason for presentmg the material in this shape is, we have to construct certain intercepting sewers to take out the sewage and carry it to certain designated points for treatment. Having done so, those sewers serve for a certain population, and we have taken the tributary populations and added them together in order to supply a project that would come approximately to the population set by the plan. In order to bring it exactly to the plan, we would have to provide a little additional treatment, as I remember, because I think the figure of 4,251,000 is a little lower than the amount called for, which would of course increase the expense of the construction.

I did not endeavor to bring it out exactly by taking the per capita figures and equating them by slide rule, but have left them in this shape to show exactly the projects that would be developed, and what they would accomplish.

If the flow were cut to 4,167 c. f. s., it would be necessary, we believe, by 1945, that the West Side plant, instead of being constructed with settling tanks would be equipped for complete treatment, probably by activated sludge. We would still leave the South West plant as a settling plant. Such a program would provide in the year 1945, for the population equivalent of 5,328,000, which comes within four per cent of the figures set.

The same explanation would apply here as made, namely that in order to come out exactly to the population set by the population computations, sufficient additional treatment would have to be provided on one plant by sprinkling filters or other means, to bring up the total, which can be done, but would increase the amounts of the estimates.

The additional construction cost necessitated by the cut in diversion would exceed $16,800,000 if carried out by 1945. I have my doubts whether this could be done at the rate of progress that is necessitated by the methods of administration in our work and the financing, judging by past experience.

I have therefore estimated that in order to finance the work, cover the legal requirements and the like, somewhat more time would be required than on the previous work, which has been taken to be a period of ten years. In the interval from 1945 to 1955, in which the extent of that cut would be made, working on our assumptions, there would have to be expended not only the sum of $16,800,000 as noted, but a further sum roughly estimated at $16,710,000, making a total of $33,510,000, to cover the growth in population, which would have to be treated, as well as the difference required on account of the lowered diversion.

194 In addition to these figures, the filtration of the water supply of the City of Chicago would be required, so that as of the year 1955, there would be added $106,500,000 to the program requiring financing.

The true cost of the additional population is not shown by our method of computation outlined, because the method of assembling by districts indicates a comparative cost for handling the sewage with a reduced diversion, which is lower than it really is, if you take the per capita costs and multiply by the population. That comes in the method of assembling the projects and calculating the cost of intercepting sewers in this treatment.

I have estimated the cost of the activated sludge plants with intercepting sewers as $25 per capita, with an annual cost of around $2.25 to $2.75 according to the method of handling the sludge. I am therefore conservative in saying the cost in round figures on account of this cut in diversion would add to the sewage treatment program approximately $25,000,000 based on the actual per capita charges for construction, and $2,250,000 for annual costs.

If the diversion was cut to 4,167 cubic feet per second, I believe that there will be ultimately a heavy burden placed upon the cities and industries located on the Illinois River, particularly in the metropolitan area around Peoria and Pekin. While in 1920, the census population was only 88,207 for the two cities, there was in addition a starch works at Pekin grinding about 25,000 bushels of corn a day, equivalent to 158,000 people, besides other Corn Products industries about which little data could be obtained.

This equivalent population, through growth of industry as well as of population, I have estimated might exceed half a million in 1930. With the continued growth up to 1945, during low water, treatment may become necessary, making an additional burden upon the inhabitants of the State of Illinois. In 1920, the urban population on the banks of the
195 Illinois River from Joliet to the mouth totaled 200,472.

Table of expenditures for sewage treatment since 1909 for construction purposes, Pearse Exhibit 2, April 26, 1923, is as follows:

Expenditures for Sewage Treatment since 1909 for Construction Purposes

219

Year	Total
1910	$ 157,816
1	.....
2	55,269
3	19,683
4	490,468
5	280,348
6	700,648
7	1,533,260
8	1,543,227
9	1,803,064
1920	2,835,387
1	5,052,511
2	6,691,982
	$21,163,663

195 Table of expenditures for sites for sewage treatment works up to 1921, Pearse Exhibit 3, April 26, 1923, is as follows:

PEARSE EXHIBIT 3—Apr. 26/23

The Sanitary District of Chicago

Expenditures for Sites for Sewage Treatment Works Up to 1921

219

Treatment plant	Amount paid for site	When acquired
Calumet Pumping Station	$ 12,423.40	May 27, 1915
Calumet Treatment Plant	159,636.00	Feb. 13, 1920
Desplaines Treatment Plant	25,194.00	Oct. 4, 1917
52nd Ave. Treatment Plant	39,505.88	Mar. 31, 1913
Evanston Pumping Station	11,341.60	April 20, 1916
North Side Treatment	269,995.00	April 21, 1921

195 This table was made in the same way, from the records of the District, checking the amounts against the vouchers paid, and the dates against the orders of the Board printed in our proceedings.

Since 1909, up to the end of 1922, there has been expended under my direction by our engineering and laboratory forces the sum of $97,842, for construction and equipment on sewage testing work.

In addition to this sum, we have spent in the maintenance and operation of the works, including the operating of our laboratories and the other expenses chargeable to the investigations, the sum of $563,815. This makes a total expenditure on our books for construction, equipment, maintenance and operation of $661,657.

When I first came with the District in 1909, the art of sewage treatment was less understood on a large scale than now. There was a transition period in the art; the old septic tank was in disfavor, as originally installed at Columbus. Experiments were found to be necessary, and were devised by men of the standing of Mr. Rudolph Hering, and others who studied the problems of the District, and had been connected with it since its inception in 1889.

We found the sewages we had to meet were so varied in strength and behavior that tests were needed to define the 196 most efficient method of treatment. Tests were needed in order to find how much sewage could be treated with a given area of plant; for instance in sprinkling filters, how many hours were required for the settling of the sewage in settling tanks.

We saw very clearly that the problem ahead of the District in 1909, was a gigantic one, involving the largest sewage treatment works in the world, and involving the necessity of producing a high grade effluent for a large part of the sewage of the District.

In addition, we had to confront not only the human problem but the industrial waste problem of enormous extent, and at

that time no solution was known for its treatment. Neither was the amount of the waste known. The period required for preliminary investigation was indefinite, but we knew that we had to study the sewage, not alone as to methods of treatment, but also to improve the methods of analysis.

The method I have explained of determining the oxygen consumption was one of our changes in method which has enabled us to express population equivalents. Short time tests we knew were of little value. Our experience had shown that at least a test running over the four seasons of the year was required, because the operation of a sewage plant is different in the winter from the summer; and usually at the end of the year we had found improvements or changes in the studies that led us to continue.

Aside from the tests, surveys were required of the District. Preliminary plans had to be made; sites had to be secured, and then legal obstacles had to be overcome.

Our lawyers finally determined that the Act had to be amended, which was done in the last session of the Legislature, over two years ago now, whereby we were given the explicit right and command to build sewage treatment works, whereas prior to that time, I was informed that our right to establish complete works was in doubt and open to contest.

The opinions, I think during Mr. Adcock's incumbency as attorney, and prior to that time, were that whatever we did was merely an incident, and there might be a doubt if we had to condemn a site as to whether our powers would be seriously questioned, because we were acting more or less under implied powers, instead of actual, explicit powers.

I regard the population figures as presented as very fair. They are calculated from census figures, which are as close as we can auctually get them. We have had the advantage of the actual enumeration districts of the census. In representing the actual loadings on the Main Channel, we believe they may prove low rather than high, because of the fact we
197 have made no allowance in the figures for the floating population in Chicago, and in particular for the Loop Dis-

trict. In 1920, this was estimated at 250,000 people. Of these 250,000, some are commuters from within the boundary of the district, but many undoubtedly come from the outside, according to our figures.

The hotels and clubs we think may house 100,000 people The increase in floating population we have determined to be approximately 50,000 for every decade, so that we believe by 1945, that there is an effect from the floating population which might be between 375,000 and 475,000, for which we have made no allowance in these estimates.

We have also made no allowance for any factor of safety, to take care of the variations due to the variations in industry, or to extremely hot weather, which you may get in the summer time, that would upset our allowance of the effect of the water taken from the Lake, or for other contingencies.

Neither have we allowed for any extension of the boundaries of the district, which I believe will undoubtedly occur, as shown by our past experience. All these factors would tend to increase the expenditures for sewage treatment.

I think the estimates of costs of construction are conservative. We based them on unit prices slightly lower than have prevailed in the last two years. The office experience in the Sanitary District during the last two years, and in fact since the beginning of the war, has indicated that the contractors that we have to deal with want more for doing the work than we as engineers generally estimate. I think in our experience in the last two years, if I am not mistaken in my recollection, we have in general received figures that are higher than the estimates we have made as engineers, along the lines indicated in my evidence.

I have further assumed that the general conditions of labor, and of the material market, will continue. I have not attempted to estimate the possible changes that may occur in the stretch of twenty-five years.

Table of expenditures for construction of sewage treatment works 1910-1922, as Pearse Exhibt 4, April 26, 1923, page opposite.

Henry M. Christie, witness for the defendant, testified as
198 **follows** (April 26, 1923; Rec. Vol. VIII, pp. 198-201):

Resides at Chicago; employ of Sanitary District since 1892, except during the years 1901-1902 and 1909 to 1910; familiar with the accounts; compiled a table showing present and future resources of the District by way of bond issue, tax income showing annual expectations in income from those sources, consolidated with certain estimates of the Sanitary District Engineers as to construction program; table covers years 1922 to 1945, inclusive. The table known as Christie Exhibit 1, April 26, 1923, page opposite.

Column 1 shows the years; column 2 shows the population increment as based on rates of increase shown by the last
199 decennial period; column 3 shows estimated valuation, assessed valuation as taken from information obtained from the Assessor's Office of Cook County, the increases being based on past experience; column 4 shows the assessed valuation per capita; column 5 shows future tax rate as taken uniformly at 0.40 of 1 per cent, this being assumed as the limit which the Sanitary District is likely to realize under the present conditions; column 6 shows the taxes for any one year, based on the assessed valuation of the preceding year; column 7 shows future bond issues to provide revenue; column 8 shows total gross revenue and is the sum of the figures
201 in columns 6 and 7; column 9 shows the amounts required each year to liquidate the present outstanding bonds; these are for old bonds that have been issued for prior work; column 10 shows the amounts required each year to pay the interest on the present outstanding bonds; column 11 shows the amount required each year to redeem future bond issues. The bonds are figured for redemption at the rate of five per

CHRISTIE EXHIBIT 4, April 26, 1923.

Summary of Statement of Resources and Expenditures of the Sanitary District of Chicago under 1922-1945 Construction Program.

Based Upon Plants Going into Operation as follows, viz:

Desplaines	1923
Calumet	1923
Corn Products	1927
North Side	1928
Stock Yards	1932
West Side	1940
South West Side	1945

Resources:		
Taxes—Net	$211,850,000	
Sale of Bonds—Net	60,949,000	
		$272,799,000
Contra:		
New Construction	$106,300,000	
Ad. Maintenance & Operation	106,400,000	
Interest on Bonds	59,768,880	
Surplus	330,120	
		$272,799,000

Note—Bonds outstanding Jan. 2, 1946 ..... $84,050,000
Maximum bonding capacity Jan. 2, 1946 99,000,000

The Sanitary District of Chicago

Expenditures for Construction of Sewage Treatment Works 1910-1922

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	Total
W. 39th St. Conduit & Western Ave. Sewer	157,816													157,816
52nd Ave. Sewer & Outlet			55,269	3,807			4,918							63,994
52nd Ave. & W. 39th St. Sewer				15,876	140,771	28,155			16,360					201,162
North Shore Interceptor, Contract 1					197,710	52,113	30,409							280,232
North Shore Interceptor, Contract 2					86,383	14								86,397
North Shore Interceptor, Contract 3					57,106	168,529	35,290							260,925
Morton Grove Settling Plant					8,498	651								9,149
Calumet Intercepting Sewer, Contract 2							94,911	88,272	1,505					184,688
Calumet Intercepting Sewer, Contract 3						30,887	290,327	4,943						326,157
Stockyards Intercepting Sewer							96,587	*10,799	*673					85,115
Niles Center Sewer							1,442	22,695	299					24,436
Evanston Intercepting Sewer							7,571	479,901	467,731	119,570	262,982	14,016		1,351,771
Calumet Intercepting Sewer, Contract 4							57,442	300,868	258,034	28,683	116,272			761,299
Calumet Intercepting Sewer, Contract 5									2,300	48,190	628,811	20,273		699,574
Calumet Intercepting Sewer, Contract 6							95,764	198,737	226,833	65,141	231,302			817,777
Calumet Intercepting Sewer, Contract 7							25,987	448,649	446,681		126,058			1,047,375
Des Plaines River Intercepting Sewer									13,179	480,172	85,808		4,071	583,230
Calumet Pumping Station									110,978	636,847	560,790	55,021	369	1,364,005
Evanston Pumping Station										242,392	85,415	112,114		439,921
Des Plaines Treatment Plant (All Divisions)										155,654	212,377	272,745	352,609	993,385
Morton Grove Sprinkling Filter										26,415	12,465			38,880
W. 39th St. Extension (Division A)											173,915	277,155		451,070
Calumet Power Plant											249,737	729,922	145,864	1,125,523
Calumet Treatment Works (Division A)											7,197	1,547		8,744
Calumet Treatment Works (Division B)											59,158	550,594	5,000	614,752
Calumet Treatment Works (Div. C. D. E. F. G & H)											23,100	2,510,095	2,945,332	5,478,527
Calumet Intercepting Sewer, Contract 8												163,237	5,885	169,122
Calumet Intercepting Sewer, Contract 9												94,207	72,646	166,853
Calumet Intercepting Sewer, Contract 10													145,548	145,548
Calumet Intercepting Sewer, Contract 11													521,883	521,883
Oak Park Outfall												251,585	535,484	787,069
W. 39th St. Extension (Division B)													97,696	97,696
North Side Intercepting Sewer, Contract 1													1,902,700	1,902,700
Total	157,816		55,269	19,683	490,468	280,349	740,648	1,533,266	1,543,227	1,803,064	2,835,387	5,052,511	6,735,087	21,246,775

*Credit from Union Stockyards and Transit Co.

April 19, 1923.

Christie Exhibit 1—April 26, 1923.
Composite statement, estimated resources and liabilities under 1940 construction program of Sanitary District.

Year	Population	Assessed valuation		Receipts				Expenditures							
								Outstanding bonds.		Future bond issues					
		Total	Per capita	Tax rate per $100 valuation	Tax receipts levy less 10% a/c costs and delinquencies	Bond issues	Total	Redemption	Interest	Redemption	Interest	Administration & maintenance & operation	Total	Net revenue available for new-construction	C
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	
1921	3,071,000	$1,824,157,564	$594	$0.36		*$3,750,000									
1922	3,142,	1,870,	595	.40	$5,900,000	2,000,000	$11,650,000	$1,551,000	$ 944,440			$2,100,000	$4,595,440	$7,054,560	$6
1923	3,213,	1,915,	596	.40	6,650,000	6,000,	12,650,	2,146,	1,129,340	$1,000,000	$90,000	2,400,	5,865,340	6,784,660	7
1924	3,284,	1,965,	598	.40	6,900,000	6,000,	12,900,	1,980,	1,035,960	400,	355,500	2,500,	6,271,460	6,628,540	7
1925	3,355,	2,015,	600	.40	7,100,	7,000,	14,100,	1,880,	949,060	700,	607,500	2,600,	6,736,560	7,363,440	7
1926	3,426,	2,065,	603	.40	7,250,	7,000,	14,250,	1,824,	866,160	1,050,	891,000	2,700,	7,331,160	6,918,840	7
1927	3,497,	2,115,	605	.40	7,450,	8,000,	15,450,	2,124,	785,500	1,400,	1,158,750	2,800,	8,268,250	7,181,750	6
1928	3,568,	2,170,	608	.40	7,600,	7,000,	14,600,	2,076,	685,340	1,800,	1,455,750	2,900,	8,917,090	5,682,910	6
1929	3,639,	2,225,	611	.40	7,800,	9,000,	16,800,	2,076,	587,100	2,150,	1,689,750	3,900,	10,402,850	6,397,150	6
1930	3,710,	2,280,	615	.40	8,000,	9,000,	17,000,	1,951,	488,860	2,600,	1,998,000	4,500,	11,537,860	5,462,140	5
1931	3,782,	2,345,	620	.40	8,200,	8,000,	16,200,	1,373,	395,620	3,050,	2,286,000	4,500,	11,604,620	4,595,380	5
1932	3,854,	2,400,	623	.40	8,450,	8,000,	16,450,	1,270,	330,500	3,450,	2,506,750	4,500,	12,057,250	4,392,750	4
1933	3,926,	2,460,	627	.40	8,650,	8,000,	16,650,	770,	269,500	3,850,	2,713,500	4,500,	12,103,000	4,547,000	4
1934	3,998,	2,520,	630	.40	8,850,	8,000,	16,850,	770,	233,500	4,250,	2,900,250	4,500,	12,653,750	4,196,250	4
1935	4,070,	2,580,	634	.40	9,050,	8,000,	17,050,	770,	197,500	4,650,	3,069,000	4,500,	13,186,500	3,863,500	4
1936	4,142,	2,645,	639	.40	9,300,	9,000,	18,300,	670,	161,500	5,050,	3,219,750	4,500,	13,601,250	4,698,750	4
1937	4,214,	2,710,	643	.40	9,500,	9,000,	18,500,	670,	129,500	5,500,	3,397,500	4,500,	14,197,000	4,303,000	4
1938	4,282,	2,780,	650	.40	9,750,	9,000,	18,750,	520	97,500	5,950,	3,355,000	4,500,	14,622,500	4,127,500	4
1939	4,354,	2,850,	654	.40	10,000,	9,000,	19,000,	520,	71,500	6,400,	3,692,250	4,500,	15,183,750	3,816,250	4
1940	4,425,000	2,120,000,000	660	.40	10,250,000	11,000,000	21,250,000	520,000	45,500	6,850,000	3,809,250	6,000,000	17,224,750	4,025,250	4
1941															
Totals					$156,650,000	$151,750,000	$308,400,000	$25,461,000	$9,403,880	$59,200,000	$39,395,500	$72,900,000	$206,360,380	$102,039,620	$101

*$3,750,000 cash available February, 1922

Compiled by H. M. Christie and H. P. Ramey.

Christie Exhibit 1—April 26, 1923.
Composite statement, estimated resources and liabilities under 1940 construction program of Sanitary District.

Valuation		Receipts			Expenditures										
					Outstanding bonds,		Future bond issues								
Per capita	Tax rate per $100 valuation	Tax receipts levy less 10% a/c costs and delinquencies	Bond issues	Total	Redemption	Interest	Redemption	Interest	Administration & maintenance & operation	Total	Net revenue available for new-construction	Construction program	Year	Bonds outstanding Jan. 1	Bonding capacity maximum
(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
$594	$0.36	.....	*$3,750,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	1921	.....	$54,723,000
595	.40	$5,900,000	2,000,000	$11,650,000	$1,551,000	$ 944,440	.....	.....	$2,100,000	$4,595,440	$7,054,560	$6,400,000	1922	$25,851,000	56,100,
596	.40	6,650,000	6,000,	12,650,	2,146,	1,129,340	$1,000,000	$90,000	2,400,	5,865,340	6,784,660	7,000,	1923	26,300,	57,450,
598	.40	6,900,000	6,000,	12,900,	1,980,	1,035,960	400,	355,500	2,500,	6,271,460	6,628,540	7,000,	1924	30,054,	58,950,
600	.40	7,100,	7,000,	14,100,	1,880,	949,060	700,	607,500	2,600,	6,736,560	7,363,440	7,000,	1925	33,674,	60,450,
603	.40	7,250,	7,000,	14,250,	1,824,	866,160	1,050,	891,000	2,700,	7,331,160	6,918,840	7,000,	1926	38,094,	61,950,
605	.40	7,450,	8,000,	15,450,	2,124,	785,500	1,400,	1,158,750	2,800,	8,268,250	7,181,750	6,600,	1927	42,220,	63,450,
608	.40	7,600,	7,000,	14,600,	2,076,	685,340	1,800,	1,455,750	2,900,	8,917,090	5,682,910	6,100,	1928	46,696,	65,100,
611	.40	7,800,	9,000,	16,800,	2,076,	587,100	2,150,	1,689,750	3,900,	10,402,850	6,397,150	6,000,	1929	49,820,	66,750,
615	.40	8,000,	9,000,	17,000,	1,951,	488,860	2,600,	1,998,000	4,500,	11,537,860	5,462,140	5,500,	1930	54,594,	68,400,
620	.40	8,200,	8,000,	16,200,	1,373,	395,620	3,050,	2,286,000	4,500,	11,604,620	4,595,380	5,200,	1931	59,043,	70,350,
623	.40	8,450,	8,000,	16,450,	1,270,	330,500	3,450,	2,506,750	4,500,	12,057,250	4,392,750	4,200,	1932	62,620,	72,000,
627	.40	8,650,	8,000,	16,650,	770,	269,500	3,850,	2,713,500	4,500,	12,103,000	4,547,000	4,200,	1933	65,900,	73,800,
630	.40	8,850,	8,000,	16,850,	770,	233,500	4,250,	2,900,250	4,500,	12,653,750	4,196,250	4,200,	1934	69,280,	75,600,
634	.40	9,050,	8,000,	17,050,	770,	197,500	4,650,	3,069,000	4,500,	13,186,500	3,863,500	4,200,	1935	72,260,	77,400,
639	.40	9,300,	9,000,	18,300,	670,	161,500	5,050,	3,219,750	4,500,	13,601,250	4,698,750	4,200,	1936	74,840,	79,350,
643	.40	9,500,	9,000,	18,500,	670,	129,500	5,500,	3,397,500	4,500,	14,197,000	4,303,000	4,200,	1937	78,120,	81,300,
650	.40	9,750,	9,000,	18,750,	520	97,500	5,950,	3,355,000	4,500,	14,622,500	4,127,500	4,200,	1938	80,950,	83,400,
654	.40	10,000,	9,000,	19,000,	520,	71,500	6,400,	3,692,250	4,500,	15,183,750	3,816,250	4,200,	1939	83,480,	85,500,
660	.40	10,250,000	11,000,000	21,250,000	520,000	45,500	6,850,000	3,809,250	6,000,000	17,224,750	4,025,250	4,200,000	1940	85,560,000	87,600,000
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	89,190,000	89,700,000
.....	.....	$156,650,000	$151,750,000	$308,400,000	$25,461,000	$9,403,880	$59,200,000	$39,395,500	$72,900,000	$206,360,380	$102,039,620	$101,600,000	.....	.....	.....

cent per annum; column 12 shows the interest on outstanding bonds; column 13 shows the estimated cost of administration and running expenses of maintenance and operation of the works of the Sanitary District, based on the experience of recent years; column 14 is the total; column 15 is the net revenue. Christie Exhibit 4, opposite.

Tests made by the Sanitary District to determine length of time required to change flow in channel from 4,167 seconds feet to 10,000 seconds feet.

George M. Wisner, witness for defendant, his qualifications being heretofore shown (This Narrative, p. 177; April 15, 1914, Rec. Vol. VI, pp. 3404-3405), testifying in sur-rebuttal said:

Since testifying previously, I have had two different tests made, one on February 22 and the other on March 8, 1914, to determine how much the discharge in the main channel and the Chicago River would change when the discharge at the Controlling Works was increased from approximately 4,000 cubic feet per second to 10,000 cubic feet per second.

3405 For the 12 hours preceding the time at which the flow was changed from approximately 4,000 cubic feet to 10,000 cubic feet per second, we tried to adjust the flow of the canal so as to have as near as possible a uniform flow of 4,000 cubic feet through the channel.

3406 On February 22, and 23, from six P. M. until about 5:30 A. M., we flowed as near as it was possible 10,000 cubic feet through the Controlling Works and measured the water, as I stated, at the other places by means of current meters. The gaged were also read.

The flow was increased at about 5:53 to about 6:10; took that long to increase the flow, manipulate the works; that is P. M. on February 22. Generally, I would say throughout

that time the flow according to the power house measurements probably averaged 200 cubic feet over 10,000.

The computations were worked up of the discharge at Lemont and at Summit and Dearborn Street.

The section at Summit was about four or five miles above Willow Springs. The discharge measurement at Lemont was taken by means of a Haskell Current Meter; at Summit we used the Price Meter; and at Dearborn Street a Haskell Meter. We only had those three meters available at that time.

I would have run this test longer but it was absolutely impossible to do it without absolutely breaking a lot of contracts that we had for the furnishing of power, and I could not run it at that time any longer than the 12 hours approximately, as testified to.

The largest flow that we were able to get at Lemont was 9300 cubic feet per second, within the whole time between six o'clock P. M. of February 22, and 5:30 of the next morning.

There is a peculiar thing that seems to happen when this flow is turned on: There will be an indication of a large flow at Lemont about an hour and a half to an hour and 50 minutes after the flow was increased at Lockport.

It is eight miles from the old Controlling Works in round figures, and ten miles from the power house. That flow
3407 only keeps up for a very short time, and it drops off as though there were possibly an influence, an impulse set up in the water; and the water only being measured at one particular point, I am of the opinion you get a false indication of the discharge at that time, because the flow then did not go up again until about 3:30 the next morning.

That was an hour and a half afterwards. Then it dropped off to about 8200 cubic feet per second.

It reached that at ten o'clock at night, when it raised gradually to 9300 and some odd cubic feet per second at 3:30 the following morning. That is we had 9300 flow twice, about 7:30. About an hour and a half after we started to turn it

on at about 5:50. Then it went down to about 8,000 cubic feet per second between 9:30 and 10 o'clock that night. Then gradually rose to 9300 feet at about 3:30 the following morning.

At Summit, the first indication of the increase in the discharge came at seven o'clock, and it gradually rose so that at eight o'clock there was a flow of 7,000 cubic feet. There was a gradual rise of the discharge at Summit then until
3408 about one thirty, when the flow reached 8200 cubic feet. From then until the end of the test, at about six o'clock the next morning, the flow ran practically 8,000 cubic feet. It is about four or five miles above Willow Springs; that is about 12 or 13 miles above Lemont. 22 miles from the power house.

The measurements at Dearborn Street were carried on, as I stated, by a Haskell Meter and the flow had an increase, starting in about 8:30 that night, began to slowly increase and raised gradually to about 2:30 in the morning when there was a flow of about 5800 cubic feet per second.

It then gradually decreased to five o'clock in the morning when there was an indicated flow of 5500 cubic feet per second; and from five o'clock in the morning until six in the morning it increased, so that at that time there was approximately 6200 cubic feet per second passing Dearborn Street.

I would say in this connection that Dearborn Street being so close to the lake, it is influenced by the rise and fall of the lake.

The height of Lake Michigan generally varied during February 22d and 23d, at the time of the tests, from plus .5 up to plus .9, in round numbers; but the elevation of the lake
3409 varied two or three-tenths within half an hour, at times.

We made another measurement on March 8, as stated before. I did this to have a check upon the first one; and tried to make it under a little better conditions; used more current meters, more discharge sections. It was a more complete

test, and ran over a longer period. The weather conditions were better.

Prior to increasing the flow, we tried to get as near uniform flow at about 4,000 cubic feet per second as was possible. We started in on that day early in the morning of March 8 flowing 4,000 cubic feet per second.

That was changed so that we seemed to have a fairly even flow there for some distance above the Controlling
3410 Works; and the flow was increased at 12 o'clock noon to 10,000 cubic feet per second. We maintained the flow at 4,000 cubic feet per second from about three or four in the morning until twelve noon of March 8. Of course it took some time to get the rest of the channel flowing that amount. For instance, around the different gaging stations the flow seemed to vary between four and five thousand cubic feet per second, at the different sections, at twelve noon, when we changed the flow.

The flow was put on at about 11:50 in the morning and at 12:00 noon, or shortly after that, there was 10,000 going through the Controlling Works and power house at Lockport; and the flow as indicated there got up as high as 10,500; but it ran at 10,000 or above until one A. M. of the following day.

There were discharge sections at Dearborn Street, Loomis Street, Robey Street, Willow Spring, Lemont and at Lockport; the Lockport discharge section being about a half a mile this side, or towards Chicago, from the old Controlling Works in the Rock Section.

From Lockport up—first was the Controlling Works and then the Lockport discharge section; Lemont, Willow Springs, Robey Street, which is the junction of the Chicago River and the Canal; Loomis Street, Dearborn Street.

3411 From the Power House to Lockport, 2.46 miles; to Lemont from the the same place (I will give the distances every time from the Power House) 9.51 miles; Willow Springs, 16.93 miles; Summit 22.30 miles; Robey street, 29.90

miles; Loomis street, 31.0 miles; Dearborn Street, 35.2 miles: Lake Michigan, 36.3.

The flow at the Controlling Works averaged 10,000 cubic feet per second from 12:00 o'clock noon until 2:45 the next morning, a time interval of 14 hours and 45 minutes.

The flow at the Lockport discharge section was approximately 4,000 cubic feet per second when we started, and the indicated flow was 8,000 at about half past twelve, or half an hour later. At 1:50 to 2:00 o'clock, the flow at this station reached a little over 8900 cubic feet per second, and it ran approximately at that flow until 5:30 P. M. of March 8. It then increased to 10,000, which it reached at 7:00 P. M. of March 8.

The flow at this discharge section then varied from 10,000 to 10,400, and down to 9500 at 3:30 A. M. of March 9. That is the Lockport discharge.

They were run continuously from about 10:00 A. M. of March 8, until 9:30 to 10:00 A. M. the next day, with the exception of the Dearborn Street Section, which was dis-
3412 continued at 12:00 o'clock midnight on account of an accident to the meter; and also at Lemont. At those two places we had no record from 12:00 o'clock midnight, or 12 hours after the test started.

The next station is Lemont; and the flow at Lemont at about 12:00 o'clock varied between 4500 cubic feet per second and 5,000.

That is 12:00 o'clock noon of March 8. It gradually rose, so that at one o'clock, or one hour after the flow was increased, there was a flow of approximately 8500 cubic feet per second.

It increased uniformly from one o'clock to approximately two o'clock. In connection with the Lemont station, it did not start to increase until 12:20. At 2:00 o'clock it reached 9100 cubic feet, when it seemed to vary from a little above 9,000 to a little below 9,000, from 2:00 P. M. until 6:00 P. M. when there was a fairly uniform increase to 8:00 P. M., when the flow was 9600 cubic feet. It ran fairly uniform at this

same discharge until about 9:30, and from 9:30 it increased uniformly to 10:00, when there was an indicated discharge at Lemont of 10,000 cubic feet per second. And it continued at approximately that discharge until 12:00 o'clock, when the meter, as I said, was damaged; got out of order.

It was ten hours after the water was increased from 4,000 to 10,000, before we got a discharge of 10,000 cubic feet at Lemont.

At Willow Springs, the flow started to increase at about 12:45 P. M. From that time, it uniformly increased until 1:10 or 1:15 when the flow was 7,000 cubic feet per second. From this time until 4:00 P. M. the flow uniformly increased so that the discharge at Willow Springs was 7800 cubic feet per second. It ran practically at the same discharge until 6:10 P. M. when there was a discharge, of 8,000 cubic feet per second. From 6:10 it increased uniformly until 9:30 P. M. when the discharge was 9,000 cubic feet per second. From 9:30, the increase was uniform to 3:50, when the highest discharge was reached, amounting to 9300 cubic feet per second. That is 3:50 the morning of March 9. From then on the water dropped slightly until 6:10 or 6:20, when there was a flow of 9,000 cubic feet per second. After that the discharge commenced to decrease as the water had been lessened at Lockport.

3413

The next station where a discharge measurement was made was Robey street. The flow started to increase at 1:35 or 1:40, and at that time the indicated flow at Robey street was about 4,600 cubic feet per second. That was at 1:35 when it started to increase, and it increased uniformly to 2:20 when the flow was 5,900. From that time to 4:40 P. M., the flow as indicated was practically constant. There was a uniform increase from 4:40 to 5:40, the flow increasing to 6,500. From this time, that is, from 5:40 P. M. to 12:00 o'clock midnight, the flow increased fairly uniformly and the discharge was 7,800 cubic feet. It ran fairly constant from this time to 4:00 A. M., the discharge varying between 7,800

and 7,900 cubic feet. Beginning at 4:00 A. M. the flow gradually increased so that at 6:40 to 6:50 it ran a maximum of 8,400 cubic feet per second. From that point the discharge decreased. The change had been made at Lockport before that.

The next gaging was at Loomis street. At the beginning of the test, the flow at Loomis street as indicated by the meter was about 3,800 cubic feet. The first indication of an increase of flow, that was at all marked, was at 2:00 P. M. From 2:00 P. M. until 3:20, there was a uniform increase and the flow was 5,100. From this time to 12:30 A .M. of March 9, the flow increased fairly uniformly and there was a discharge of 7,000 cubic feet per second.

From 1:20 until 4:00 o'clock in the morning, the meter was out of service and was being repaired, and the record on that section was incomplete during that stretch; but at 4:20 the flow was 7,000 cubic feet per second and increased gradually to a maximum of 7,200 cubic feet per second at 8:30 A. M., when the flow started to decrease.

In regard to Dearborn street, I wish it understood that this section and the discharge is affected by the lake which is only a mile away from it. The discharge at the beginning of the test, as indicated by the discharge measurement at this place was about 4,200 cubic feet per second. The

3414 first marked indication of a change in the discharge started at 4:00 o'clock P. M. of March 8, when it uniformly increased, or practically uniformly increased, to the end of the test at 12:00 o'clock midnight, when the discharge amounted to 7,300 cubic feet per second.

As stated before, the meter became damaged at that time, or out of order, and no further measurements were made at that section. The flow at 4:00 P. M. at Dearborn street was 4,350 cubic feet per second.

3415 I doubt if you could get more than 9/10ths of the total change in less than from twenty-two to twenty-four hours at Robey street when the channel flow at Lockport has been increased from 4,100 to 10,000.

We made a study as to how long it would take storm water coming from the Chicago River basin to concentrate in the Chicago River in cases of storm, by the gaging of several of the large sewerage districts, in which the sewage has been measured, and we have made a study of the time after the rain starts until the maximum discharge was reached. This study has been very careful and has been carried on in the 39th Street District, and Robey Street District and the Diversey avenue sewerage district. These are three separate and distinct areas about Chicago; one of them being on the South side, another on the West side and another on the North side.

3417 These measurements were authorized by the Board of Trustees upon my recommendation, and have been carried on under my direction, and the results have been worked up under my direction. That is the Chief Engineer was directed by a resolution or ordinance of the Board of Trustees to make these measurements to install weirs and measure certain discharges from certain well defined sewerage districts.

3418 From these studies as near as we can determine, the time of concentration of the storm run-off on the large sewerage areas upon the urban drainage area of the City of Chicago will be from three to three and one-half hours. The suburban district along the North Branch North of Lawrence avenue would take in the neighborhood of twenty-four hours to reach the maximum. The discharge of 10,000 cubic feet per second will occur, in heavy storm, in the neighborhood of three to four hours. I mean there would be that amount of water coming into the Chicago River South of Lawrence avenue.

It would not be possible to so manipulate the Controlling Works at Lockport as to change the flow from 4167 to 10,000 cubic feet per second so as to prevent any of the storm water or sewage of the City of Chicago going into Lake Michigan.

3419 The engineer or executive in charge of this work of changing the flow from 4,167 cubic feet per second to

10,000 cubic feet would have to anticipate every storm by at least from twenty to twenty-one hours in order to prevent the Chicago River from discharging partly into the lake. This means that every time there was the slightest indication that there might be a rainstorm, the flow would have to be increased so that if a heavy storm did occur, the Chicago River would not be reversed and discharged into Lake Michigan.

Another point is that it would be impossible to maintain a channel from Lake Michigan to Lockport that would ordinarily flow 4,167 cubic feet per second and still be capable of flowing 10,000 cubic feet per second when needed.

For the reason that with such slow velocity as would obtain with a flow of only 4,167 cubic feet per second the channel would fill with sediment coming either from the solids of sewage and street washings or from the sediment in the lake water itself. The result would be that during the slow flow the channel would be gradually filling up with sediment so that at the time you needed a larger flow there would not be a sufficient cross sectional area to permit the flow of
3421 10,000 cubic feet per second through the canal.

COST OF NAVIGATION FEATURES OF THE MAIN CHANNEL OF APPELLANT.

John R. Freeman, testified as follows (Rec. Vol. III, 1176):

It is certain beyond all doubt or serious question that a channel over substantially the same route could have been built of sufficient capacity to carry 10,000 second feet or 14,000 second feet, which is the utmost that it is proposed to ever divert through this canal, for only a fraction of the cost that was necessitated in building a channel of the present dimensions, in order to fit it for navigation. Had the channel been built solely for sanitary purposes, that is, solely so as to give it a capacity to convey from 5,000 to 10,000 or 14,000
1177 second feet of water at the lowest levels to Lake Michi-

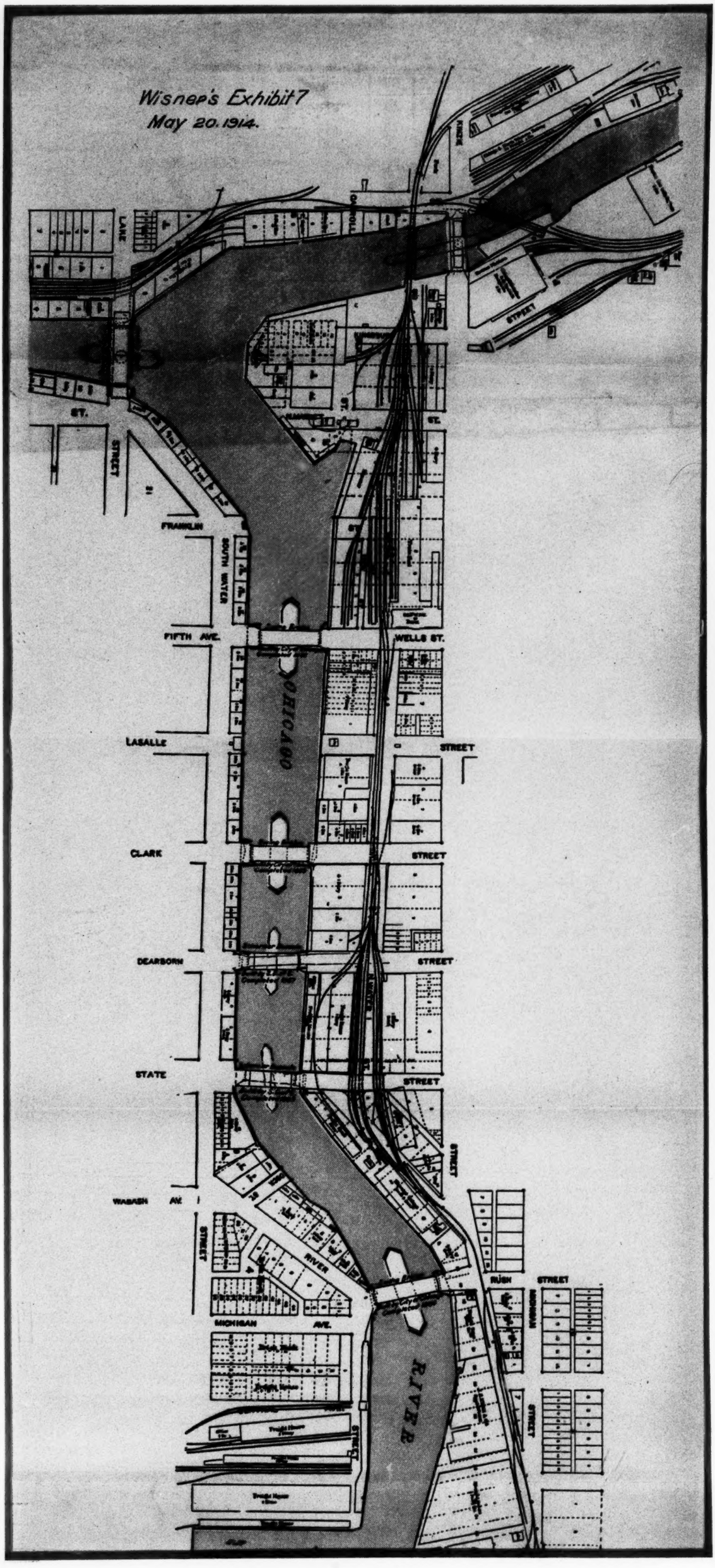
gan, a cut probably less than ¼ part of the width of the present cut would have served every purpose, for carrying 5,000 second feet considering that the slope of this channel from the Chicago River to Lockport could have been made at the steep rate of more than 1 foot per mile, and thus give a high velocity to the current.

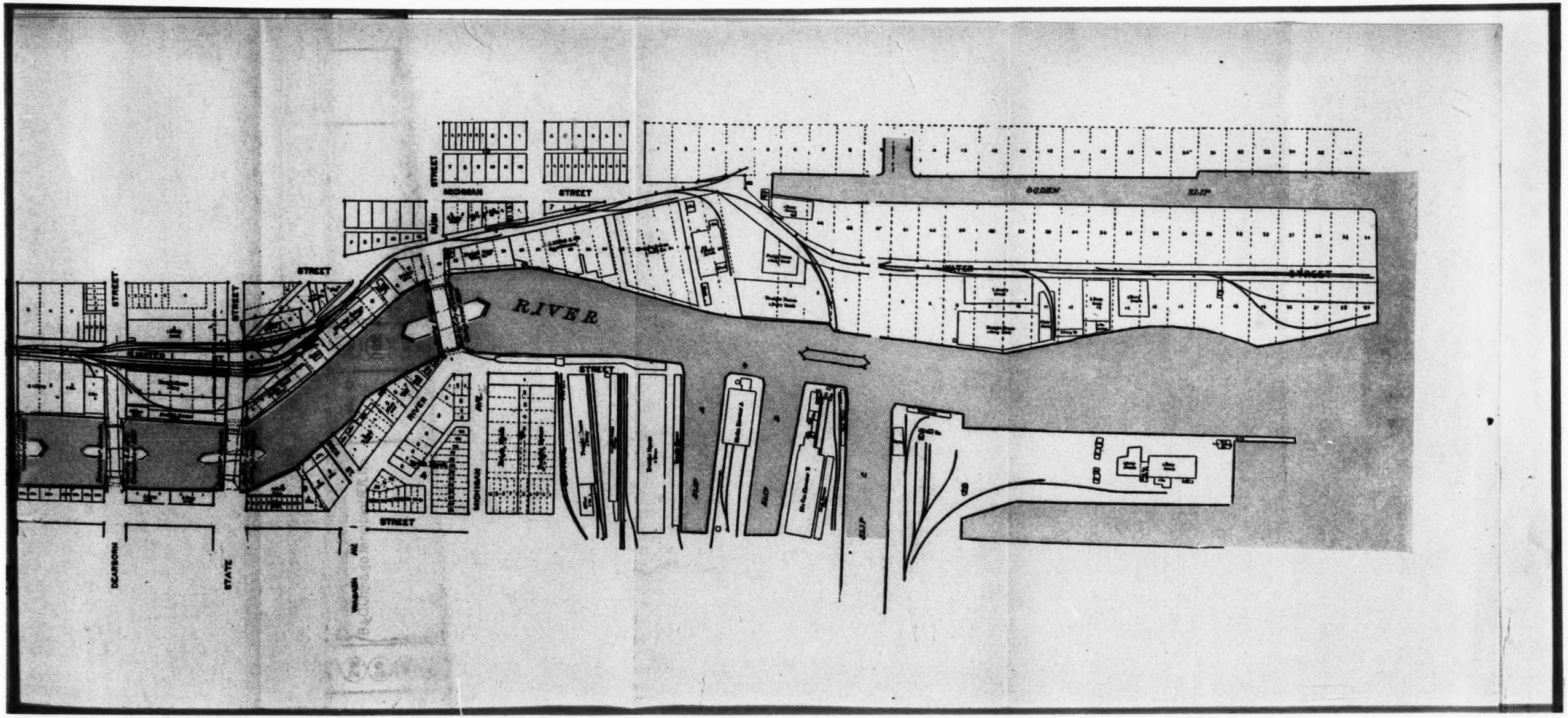
It is certain that a much narrower channel than the present would have easily carried from 10,000 to 14,000 cubic feet of water per second, and that the amount of excavation would have been correspondingly reduced.

Although I have not had time to design such a channel, and compute its cost, it is my belief from general experience in the construction of large aqueducts and canals, that careful estimates would show that more than fifteen million dollars of the expenditure actually made upon the Chicago Sanitary and Ship Canal was distinctly for the benefit of navigation at some future time. And it is my belief that at some future time, whenever the contemplated works are completed through to the Mississippi River, this extra width and capacity obtained as a result of this expenditure will far outweigh any possible injury to navigation arising upon the Great Lakes or through connecting channels, from the lowering of their levels to the extent which has been estimated.

Appellee offered in evidence a memorandum from Major Ferguson to the Secretary of War, dated November 4, 1913, concerning the intervention of the United States in a certain suit pending in the Illinois courts. This memorandum reviewed the history of The Illinois & Michigan Canal and among other things states, Rec. Vol. IV 3888, 3891, as follows:

The object, authority, and responsibility of the United States is to secure a suitable waterway from Lake Michigan to the Mississippi River. By direct appropriations such a waterway has been or is being provided for portions of the route. For the section of the route from the Illinois River


Wisner's Exhibit 7
May 20. 1914.
LAKE
STREET
FRANKLIN
SOUTH WATER
FIFTH AVE.
WELLS ST.
LASALLE
CLARK
DEARBORN
STATE
WABASH AV.
MICHIGAN AVE.
RIVER
RUSH
OHIO


RIVER
STREET
MICHIGAN
STREET
RUSH
STREET
STREET
STREET
STREET
STREET
WATER
STREET
RIVER
AVE.
MICHIGAN
STREET
DEARBORN
STATE
WABASH AVE
OGDEN
SLIP
WATER
STREET
SLIP
SLIP
SLIP

SANITARY DISTRICT OF CHICAGO

MAP

Showing

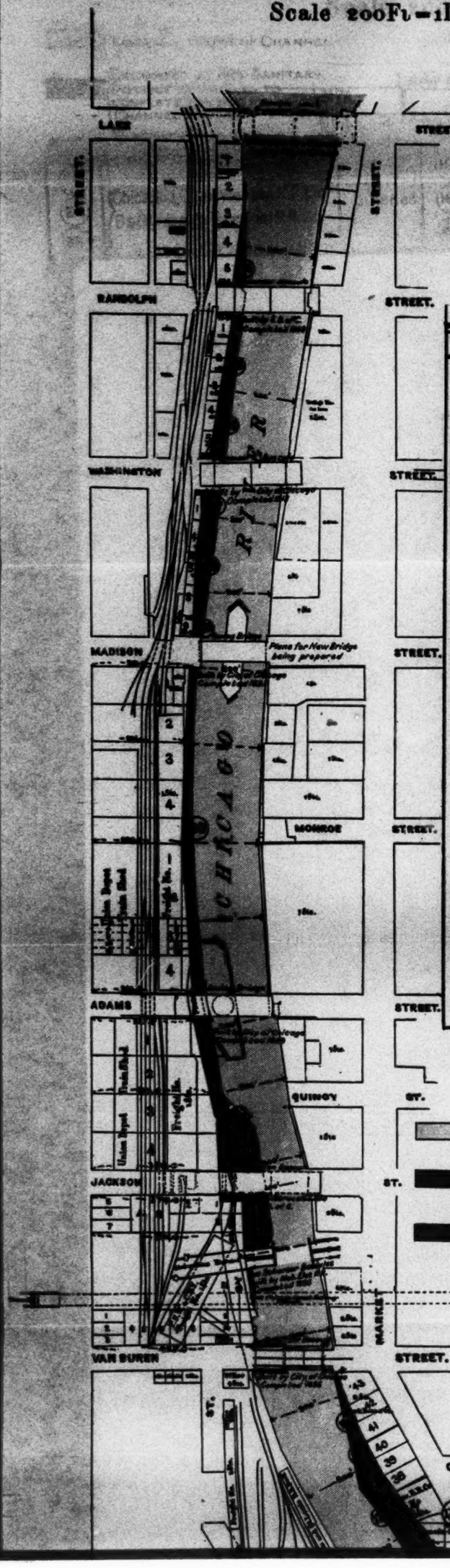
CHICAGO RIVER IMPROVEMENT

From

LAKE STREET TO 12TH STREET

Scale 200 Ft = 1 Inch

Wisner's Exhibit 8
May 20. 1914



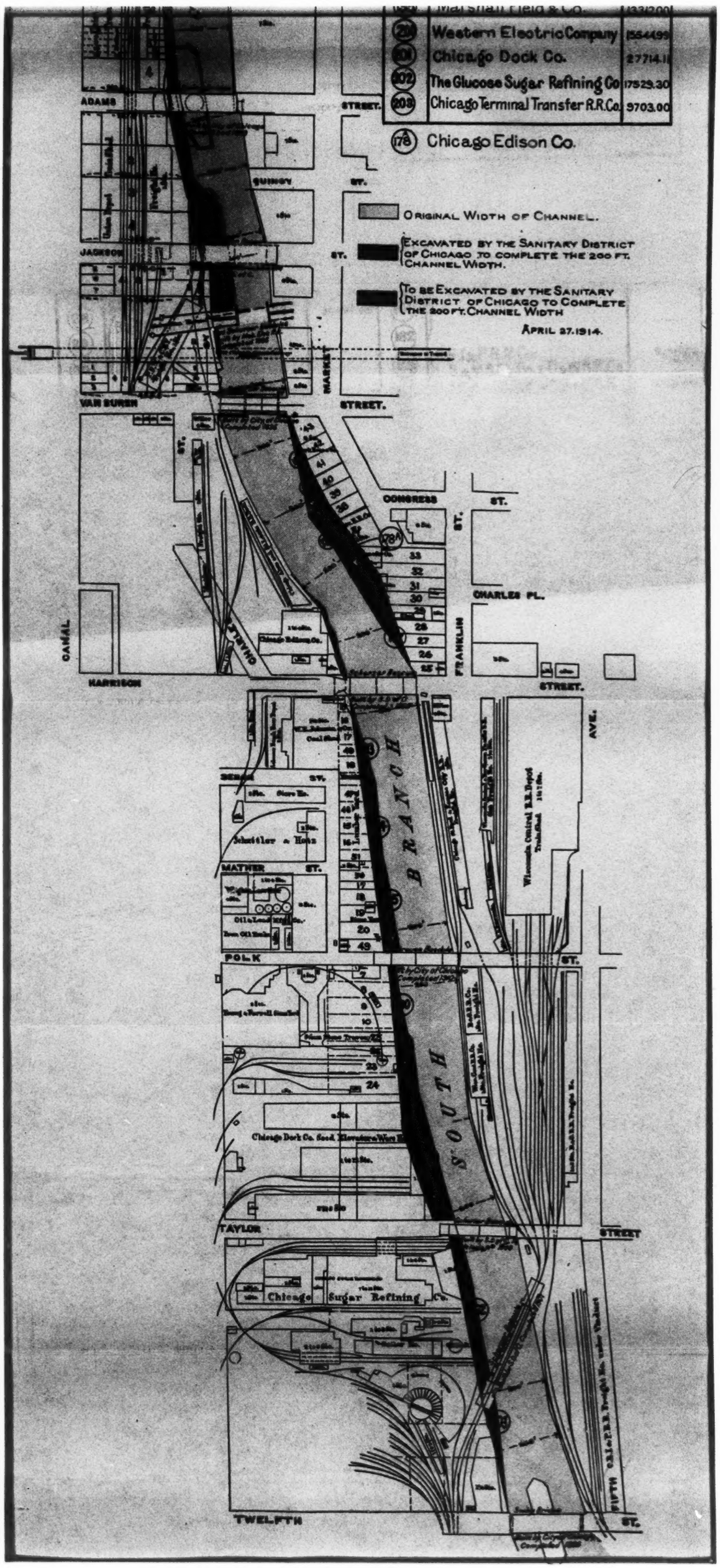
TRACT №	NAME OF OWNER	AREA SQ FT.
177	James B. Clow & Sons	4685.42
178	Charles C. Chappiret. al	1557864
179		
180	Richard L. De Zeng	3555.80
181	Clara R. Bacon & Husband	3288. 6
182	Cornelia R. Green & Husband	2593. 0
183	William C. Seipp & Wife	5075 .0
184	Joy Morton & Wife	3286.94
185	Star & Crescent Milling Co.	15825.24
186	Hugh T. Dickney Est. & Creamery Packing Mfg. Co	10213.78
187	Louisa Healy & John Cook	5456.56
188	Adelle L. Shreve Ballard Thomas T. Shreve	14046.18
189	Norton Milling Company	5123.78
190	Pittsburgh Fort Wayne	
191	and Chicago Railway	58443.13
192	City of Chicago Company et. al.	10053.00
193	Lehigh Valley Coal Co.	5103.23
194	Chicago & Alton R.R. Co.	10905.79
195	Marshall Field & Co.	13312.00
200	Western Electric Company	1554.99
201	Chicago Dock Co.	27714.11
202	The Glucose Sugar Refining Co	17529.30
203	Chicago Terminal Transfer R.R. Co.	9703.00
178A	Chicago Edison Co.	

ORIGINAL WIDTH OF CHANNEL.

EXCAVATED BY THE SANITARY DISTRICT OF CHICAGO TO COMPLETE THE 200 FT. CHANNEL WIDTH.

TO BE EXCAVATED BY THE SANITARY DISTRICT OF CHICAGO TO COMPLETE THE 200 FT. CHANNEL WIDTH

APRIL 27. 1914.


Marshall Field & Co. 1332200
200 Western Electric Company 1554499
201 Chicago Dock Co. 27714.11
202 The Glucose Sugar Refining Co 17529.30
203 Chicago Terminal Transfer R.R.Co. 9703.00
178 Chicago Edison Co.
ORIGINAL WIDTH OF CHANNEL.
EXCAVATED BY THE SANITARY DISTRICT OF CHICAGO TO COMPLETE THE 200 FT. CHANNEL WIDTH.
TO BE EXCAVATED BY THE SANITARY DISTRICT OF CHICAGO TO COMPLETE THE 200 FT. CHANNEL WIDTH
APRIL 27. 1914.
ADAMS STREET.
QUINCY ST.
JACKSON ST.
VAN BUREN STREET.
MARKET
CONGRESS ST.
CHARLES PL.
CANAL
HARRISON STREET.
FRANKLIN
SOUTH BRANCH
MATHER ST.
POLK ST.
TAYLOR STREET
Chicago Sugar Refining Co.
TWELFTH ST.
AVE.

SANITARY DISTRICT OF CHICAGO

MAP

Showing

CHICAGO RIVER IMPROVEMENT

From

12TH STREET TO 18TH STREET

Scale 200 Ft = 1 Inch *Wisners Exhibit 9*

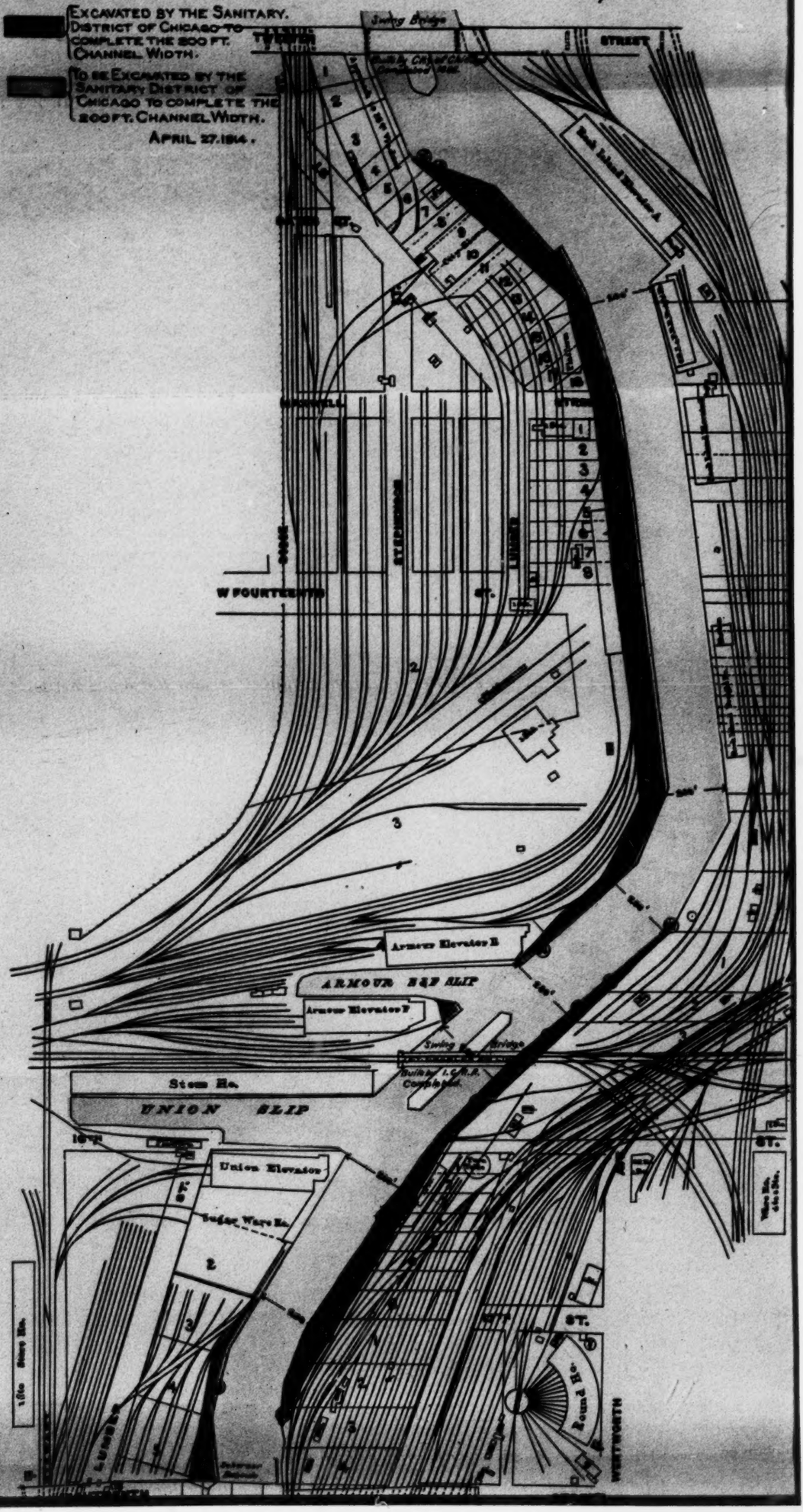
May 20 1914

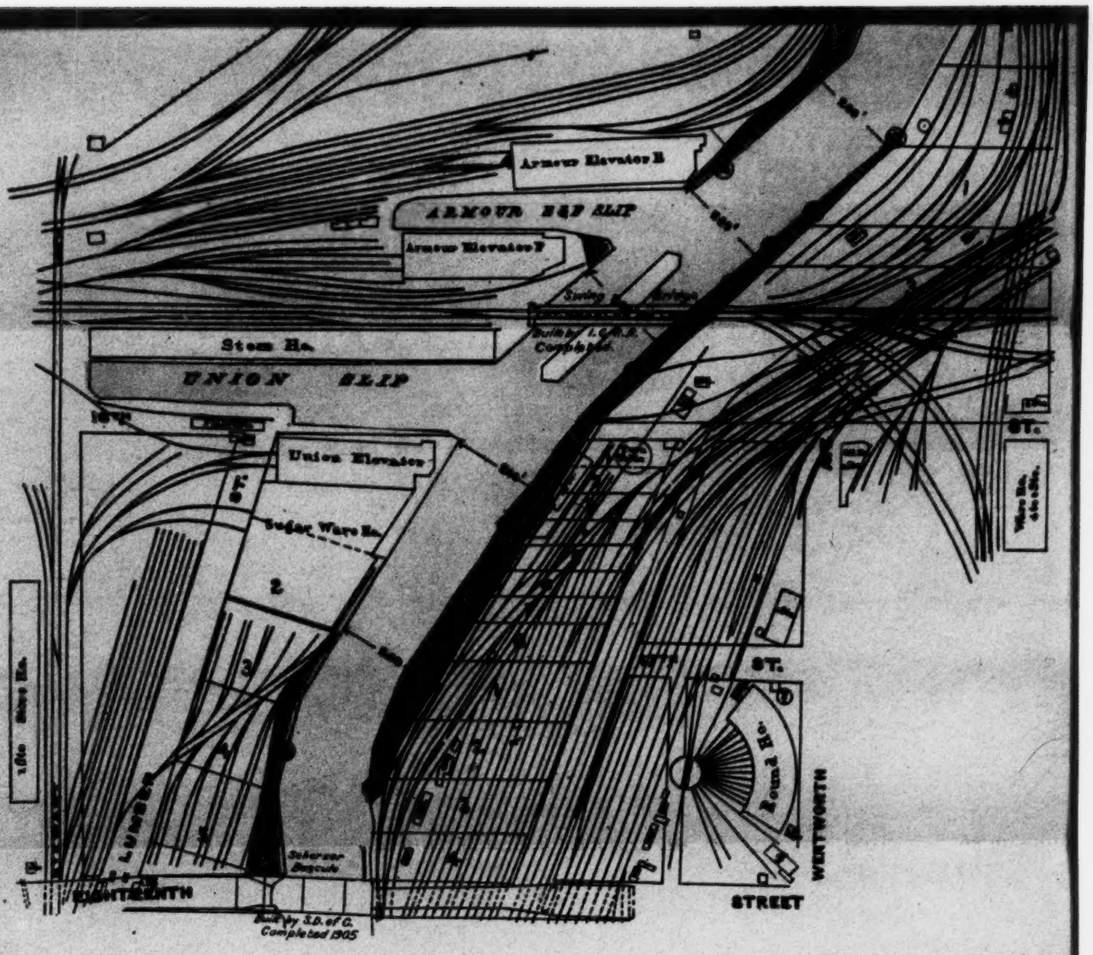
ORIGINAL WIDTH OF CHANNEL.

EXCAVATED BY THE SANITARY DISTRICT OF CHICAGO TO COMPLETE THE 200 FT. CHANNEL WIDTH.

TO BE EXCAVATED BY THE SANITARY DISTRICT OF CHICAGO TO COMPLETE THE 200 FT. CHANNEL WIDTH.

APRIL 27. 1914.





TRACT No.	NAME OF OWNER	AREA SQ. FT.	TRACT No.	NAME OF OWNER	AREA SQ. FT.
15	Chicago Terminal Transfer R.R. Co.	6,305.95	35	See Tracts 33 & 34 for Owners and Area	
16			36		
17			37A		
18			37	Chicago & North Western Ry. Co	37,772.2
18A	George M. Eckles Edith O. Eckles (City Elevator Property)	11,583.66	38		1,727.20
19			152		
20			153		
21			154		
21A			155		
22	Chicago Terminal Transfer R.R. Co	1292.63	156		
23			157	Chicago & Western Indiana R.R. Co. et. al	42,805.80
24			158		
25 S.R.			159		
26			160		
27	Chicago & Great Westen R.R. Co. B & O. Chicago Terminal R.R. Co.	31,491.65	161		
28			162		
29			163	C.R.I. & P.R.R. Co. L.S. & M.S.Ry. Co. & C. & W.R.R. Co	6,410.02 16,03
30			163A	M.C.R.R - I.C.R.R. - C.B. & Q.R.R.	1,768.80
31			164	C.R.I. & P.R.R. Co. L.S. & M.S.Ry. Co. C. & W.R.R. Co.	8,960.37
32			165		
33	George M. Eckles Edith O. Eckles (Iowa Elevator Property)	24,604.56	166		
34			167	L.S. & M.S.R.R. Co.	60 78
			82	Wm. A. Havemeyer & Rosa R. Havemeyer	5686.00

SANITARY DISTRICT OF CHICAGO

MAP

Showing

CHICAGO RIVER IMPROVEMENT

From

18TH STREET TO HALSTED STREET

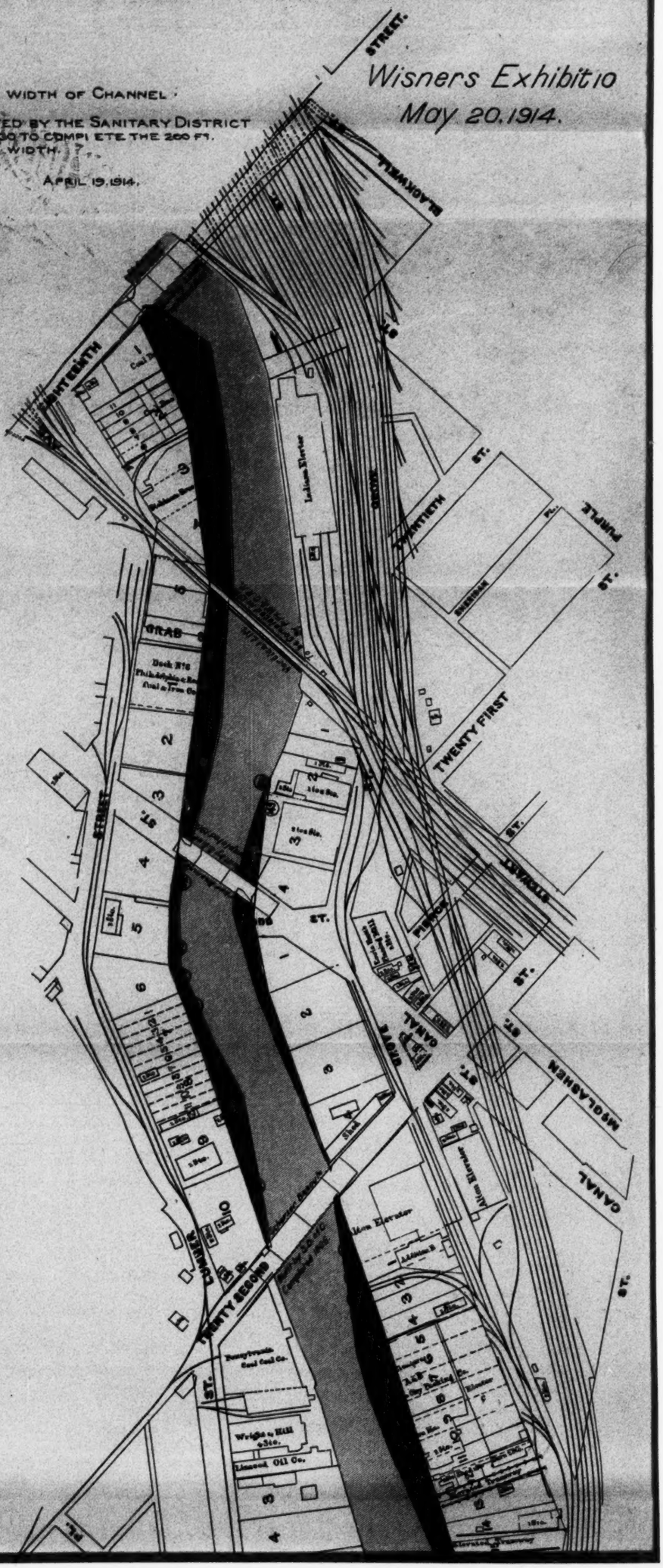
Scale 200 Ft = 1 Inch

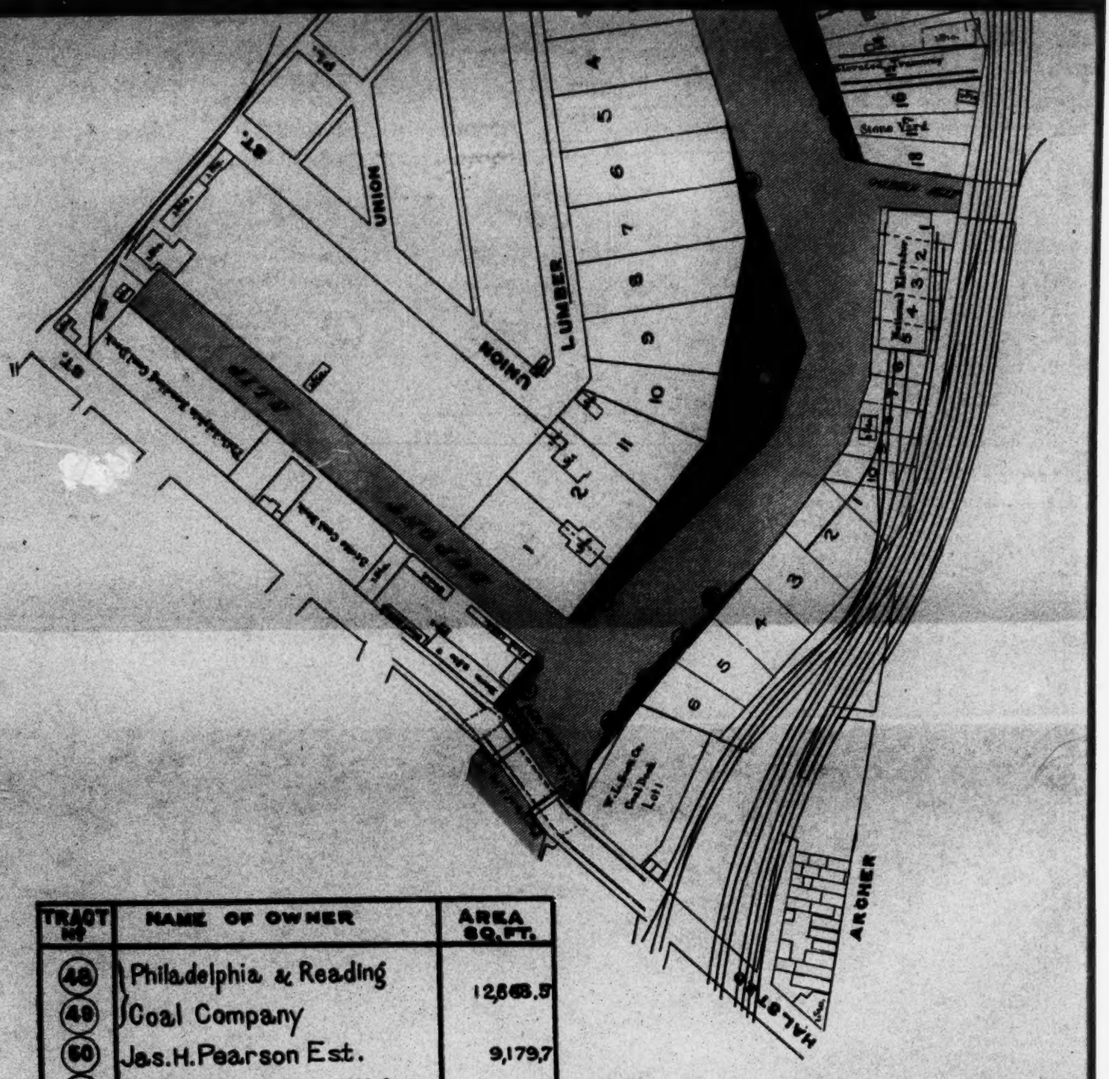
ORIGINAL WIDTH OF CHANNEL.

EXCAVATED BY THE SANITARY DISTRICT OF CHICAGO TO COMPLETE THE 200 FT. CHANNEL WIDTH.

APRIL 19, 1914.

Wisners Exhibit 10
May 20, 1914.





TRACT Nº	NAME OF OWNER	AREA SQ. FT.
48, 49	Philadelphia & Reading Coal Company	12,568.5
50	Jas. H. Pearson Est.	9,179,7
51	C.W. Tegtmeyer & Wife	5406.0
52	H.D. Gibson	2,148,5
53	Mary C. Lilly & Husband	2,905,0
54, 55	E. A. Lord et. al.	5,176,0
56	Clarence E Carr et. al.	6,239.0
57	W. Sherriffs	7,397.0
58	Illinois Stone Co.	4,480.0
65	B.F. McConnell	3,506.72
66, 67, 68	Mrs A. Babcock & Husband	25,570,02
69, 70, 71, 71A	Henry A. Du Pont	18,168.23
122, 123, 124	W.L. Scott & Co.	10,228,12

TRACT Nº	NAME OF OWNER	AREA SQ. FT.
125	C. & A. R.R. Co.	729,20
127 to 133 incl	Wm. B. Ogden Est. Western Stone Co.	15,593,47
134 to 140 incl	Nebraska City Packing Co.	27,596,86
141 to 145 incl	Seaverns Elevator Co.	14,836,19
149	Cosmopolitan Elec. Co.	1,812,65
150	General Chemical Co	616.41
41, 42	Delaware Lackawanna R.R. et al	17,041.00
41A	Robt. W. Hall & Wife	534.93
43	Thos. H. Hoyne et al.	7,631.03
44, 45, 46, 47	Jose B. King et. al.	23,133,92
146	Louis Hutt & Wife	7,101.9
147, 147A	Wm. R. Mamine & Wife	5,564.3

SANITARY DISTRICT OF CHICAGO

MAP

Showing

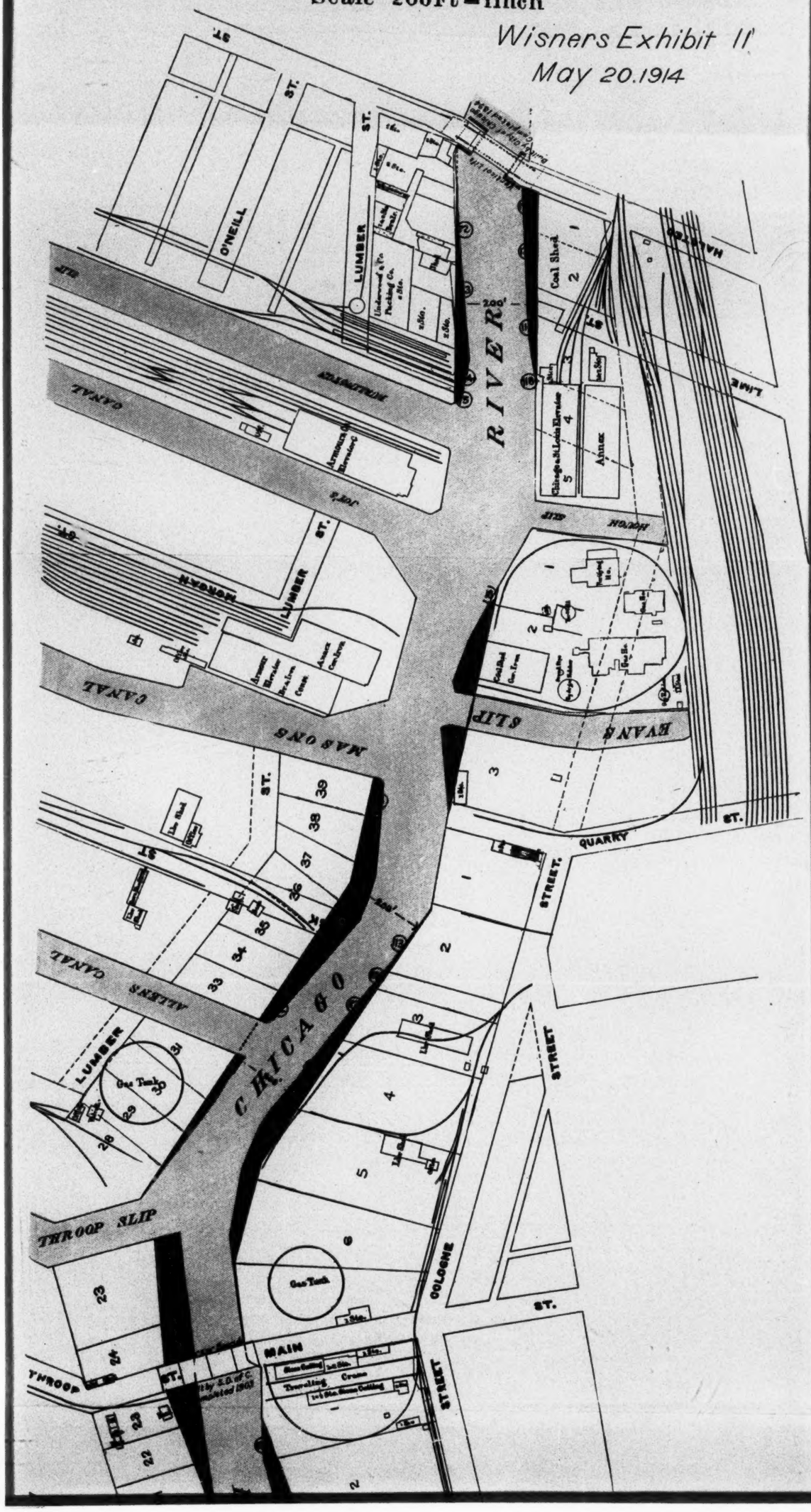
CHICAGO RIVER IMPROVEMENT

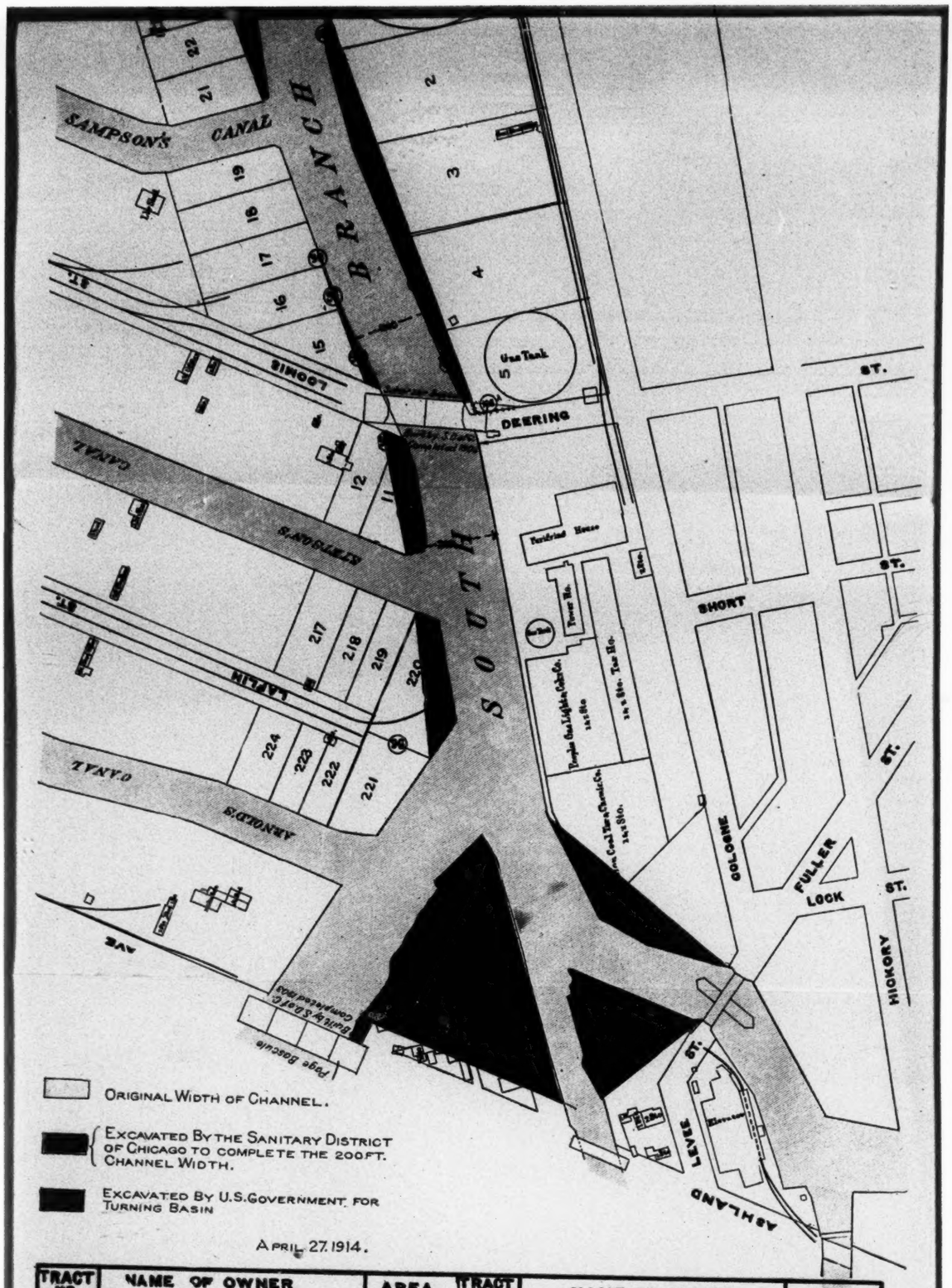
From

HALSTED STREET TO ASHLAND AVE

Scale 200Ft = 1Inch

Wisners Exhibit 11
May 20.1914





April 27. 1914.

Tract No.	Name of Owner	Area Sq. Ft.	Tract No.	Name of Owner	Area Sq. Ft.
72		1,393,47	105	Peoples Gas Light & Coke Co.	4,372,30
73	Omaha Packing Company	5,346,87	106	J.J. Mitchell et al	8,531,66
74	C.B & Q.R.R.	3,207,33	107	Francis S. Peabody Delia S. Gallup	11,255,55
75			108	Eliz Boyer	10,015,27
76 to 82 inc	Commonwealth Electric Co.	20,927,85	109	E. Heldmaier & Wife	
			111	Estate of Benj. S. Rotch	9,580,68
90	L.W. Fargo	529,44	112 & 122	Commonwealth Electric Co.	5,065,70
91			113	Drexel Estate	1,173,42
92	Wm. G. Roelker	404,80	114	North Western University	6,741,62
93			115	The Peoples Gas Light & Coke Co.	10,422,77
94			116	Peoples Gas Light & Coke Co	312,97
96	Maxwell Bro's.	2 Lots 63,953,50	118 to 121 inc	Estate of Edson Keith	11,598,86
83 to 86 inc	The Peoples Gas Light & Coke Co.	4,529,00	110	Peoples Gas Light & Coke Co	5,110,00
87 to 89 inc	Henrietta A Boel & Husband	8 674,20	105A	Peoples Gas Light & Coke Co	1,431,00

to Lake Michigan, U. S. Congress attempted to reserve the right of way in 1822. By default of Illinois this attempt became void. In 1827 Congress provided for this section by the indirect means of land grant to Illinois.

* * *

It is therefore assumed that the effect of the United States appearing in this case will be to establish (1st) the contention that there is a contract between Illinois and the United States, and (2d) the nature of this contract, whether it is (a) a narrow contract requiring specific fulfillment by enlarging this canal, or (b) a broad contract to provide a suitable waterway from Lake Michigan to the Illinois River. If the ruling be that the contract is a narrow one (a), it is believed that any attempt to enforce it will be, in fact, futile. The required dimensions of the canal are nowhere specified and it would seem that these dimensions must hereafter be determined, as they have been heretofore by Illinois. If the ruling be that a broad contract exists, the obligation resting on Illinois will not be lessened, but may be met by (1) specific fulfillment—enlarging old canal—or (2) otherwise providing a waterway, and such a ruling by her Supreme Court should have the effect of causing Illinois to decide promptly how this acknowledged obligation would be met. Illinois' self-inflicted paralysis in this case is perhaps more technical than it is intentional. She has the undoubted right to maintain this canal or not, according to her judgment on costs and benefits, but in case she refuses to maintain it, its forfeiture should be considered.

Conditions of Chicago River (April 15, 1914) compared with time prior to Sanitary District improvements.

Mr. Wisner further testified and Exhibits 7, 8, 9, 10 and 11, here shown, were offered. (Opposite this page.)

The depth of the South Branch of the Chicago River before the Sanitary District started work was approximately sixteen to seventeen feet. It is now twenty-six feet except at

a few bridge openings; that is the South Branch of the Chicago River.

3422 The central 100 feet of the stream is twenty-six feet in depth with a depth of sixteen feet at the Dock lines.

Exhibits 7, 8, 9, 10 and 11 above shown are maps of the Chicago River from Lake Michigan through the main branch of the river, and South and West on the South Branch of the Chicago River to Ashland avenue, which is about half a mile east of the beginning of the canal. The maps are drawn accurately to a scale of 200 feet to the inch and indicate the dock lines of the river, the bridges, and indicate the condition both before and after the improvement.

3423 With the exception that it does not show the location of the old bridge piers and center pier protections of the bridges that were removed and changed from the swing type of bridge to the center pier—to the bascule type of bridges. It does indicate the type of bridge, and when it is completed, as stated on the map, for instance State Street Bridge, which was built by the Sanitary District is a Scherzer bascule, as indicated, "built by the S. D. of C." meaning Sanitary District of Chicago, completed 1903. So by looking at these maps at the different bridges, you can learn by whom they were built and when completed.

The lake is on the right hand side of the map, Wisners Exhibit 7. When I say on the right hand side of the map, I mean to have it so placed that the words "Chicago River" in the part tinted blue reads right side up; that being to the East, and Lake Street being to the West.

The streets like 5th Avenue, LaSalle, Clark, State, run practically north and south, and streets like Kinzie and Lake run east and west. This first sheet shows the junction of the south and the north branches of the river.

On Exhibit 7, which is as I stated the main branch of the river, the improvements made by the Sanitary District consisted of the removal of the State and the Dearborn Street bridges, which bridges were of the center pier swing type such

as now exists at Fifth Avenue and Michigan avenue. These were replaced by the bascule type of bridge giving a wide center opening and doing away with the center pier and the center pier protection, which clogged up the river and interfered with navigation. The Sanitary District also dredged the river in the vicinity of these bridges to a depth of twenty-one feet.

On the main river, in addition to what was done by the Sanitary District, the City of Chicago removed the LaSalle Street tunnel, deepening the river at that place. The tunnel at LaSalle street interfered with navigation; the boats at times being stuck on it and blocking the river.

Wisner's Exhibit 8 of this date consists of a map of the same scale extending south from Lake street to 12th street showing the docks on the river before and after improvements made by the Sanitary District. This stretch of the river has been widened practically throughout its entire length, the widening being indicated by the dark blue tint. By applying a scale to this dark blue tinted area, the amount of the widening can be determined at any place. Generally, it varies in width from nothing to approximately ninety feet. The 3424 part tinted green of which there are two places indicated on this sheet are stretches along the river which have not as yet been widened for the reason that the property has not been acquired by the Sanitary District, but is included in the general project, and it is expected will be obtained and widened within the next year.

There are condemnation suits pending against both of these pieces of property, referring to the parts tinted green, one being on the east side of the river between Van Buren street and Harrison street and labeled "Union Elevated R. R. Co. Power House."

That is called the Union Loop Power House. The other is indicated by "Tract Number 201," the 201 being in a circle and being just north of Taylor street.

The Sanitary District has widened and excavated the river throughout this stretch to twenty-six feet in depth; has re-

moved all of that part tinted a dark blue thus widening the river, and has rebuilt all the docks where the river was widened.

The width where completed is at least 200 feet.

All except those two that have not yet been excavated. The District has removed a center pier bridge and built a bascule bridge at Randolph street, which was completed in 1903.

The Washington Street Bridge and the tunnel thereunder were removed by the City of Chicago and a new bridge completed in 1913 at this street.

The Madison Street bridge, the one that now exists, is of the center pier swing type, and is to be removed by the city of Chicago.

It has been ordered out and plans and specifications are being prepared and it will be rebuilt within the very near future.

The Jackson Boulevard Bridge is now being removed by the Sanitary District, and is to be replaced by a bridge
3425 of the bascule type, having a wide opening.

The opening of the Jackson Boulevard Bridge will be 167 feet in width; the one at Madison street, as I recall, is to be 180 feet, somewhere in that neighborhood.

The bridge openings there are only about fifty-five to sixty feet in width at the present time. At Jackson Boulevard, the opening is a little wider, I believe about ninety feet.

The next bridge to the south is the Metropolitan Elevated Railroad Company Bridge. This was ordered out by the Secretary of War.

It is part of the contemplated plan of the Sanitary District to remove and replace the Van Buren Street Bridge with a bridge having a 200-foot opening.

The Harrison Street Bridge, which was of the center pier type has been removed and rebuilt by the Sanitary District, being completed in 1905.

Polk Street Bridge which was of a similar character has been removed and was rebuilt by the City of Chicago, being completed in 1910.

Taylor Street Bridge which was of the center pier type was removed by the Sanitary District and rebuilt in 1900.

The railroad bridge just south of that and indicated as "B. & O. C. T. R. R." was of the center pier type and was built by the Sanitary District, being completed in 1901.

Twelfth Street Bridge has been ordered out by the Secretary of War and is to be rebuilt jointly by the City of Chicago and the Sanitary District, with an opening of 200 feet instead of the present opening of about fifty-five to sixty feet.

Wisner Exhibit No. 9, is the third sheet of this set, being of the same scale, and is a map of the south branch from 12th street to 18th street inclusive. The part tinted a dark blue represents the river widening performed by the Sanitary District, and the part tinted green is a piece of property not yet obtained, but which is under condemnation; and in my opinion will be obtained within the next few months, when this whole stretch of the river will have been completed; so that from Lake street to the beginning of the
3426 Drainage Canal, with the exception of the three pieces mentioned and the stretch of the river at the Metropolitan Elevated, the entire river has been widened to at least 200 feet and even to twenty-six feet or more, with the exception of the bridge openings of the old center pier bridges.

The widening on this stretch of the river varies from zero to eighty feet in width. The river was redocked and deepened as stated.

The bridge marked "St. Charles Air Line" which is practically on 16th street, is to be rebuilt by the railroad companies. Plans are now being prepared, and this bridge is to be taken out and replaced with a 200-foot opening bridge.

The 18th Street Bridge which was of center pier type was rebuilt and replaced with a bascule type bridge completed in 1905 by the Sanitary District.

Wisner's Exhibit 10 of this date is a continuation of this map and gives the Chicago River on the same scale, 200 feet to the inch from 18th street to Halsted street. The same general tinting indicates what has been done by the Sanitary District. The widening varies from nothing to nearly 140 feet in width at Collision Bend.

It got its name on account of there being so many collisions at this place before this widening was made; I mean collisions between vessels.

The original width at the Bend was a little over 100 feet. There was a narrow point on the river immediately south, or west of 18th street, and at that place the Sanitary District widened it about 120 feet at the widest point. The old 18th Street Bridge, on account of the narrow river and bend in it, the vessels were unable to use but one bridge opening, that one being on the east side of the river. By that I mean vessels of any size.

The bridge marked "P. Ft. W. & C. R. R." is a bridge owned by the Pennsylvania Railroad Company, and is now in the process of being removed; a new bridge having been built at this place with I think a 200-foot opening.

The Canal Street Birdge was built by the Sanitary District and completed in 1903. That was not of the center pier type, but was of a narrow opening type, known as a jackknife. It stood askew and was a very difficult place for navigation.

The 26th Street Bridge was of the center pier type and was removed; rebuilt by the Sanitary District; completed in 1906.

The next sheet shows in the same way the improvements made by the Sanitary District from Halsted street to Ashland avenue. The part near Ashland avenue tinted brown is a turning basin that was built by the United States Gov-

ernment to facilitate the turning around of vessels after
3427 going up the river. Generally, this river was widened throughout this stretch, throughout the entire length, to give a channel which is now at least 200 feet wide and twenty-six feet deep.

The Sanitary District removed a center pier bridge and rebuilt with a bascule bridge at Main or Throop street, completing it in 1903. And one at Loomis or Deering street, completing that in 1904; and one at Ashland avenue, completing that in 1903.

The river from Ashland avenue down the West Fork to the beginning of the Canal was over 200 feet in width, and was simply deepened by the Sanitary District to twenty-six feet in depth.

At the lower end of this last sheet the water as indicated on the left hand side of the sheet is the West Fork of the South Branch, from which the Canal starts at Robey street.

The indicated water to the right of the map is the South Fork of the South Branch, the far end of which is known as Bubbly Creek, being located near the Stock Yards, and having been mentioned in this case several times.

The middle water stretch is the entrance to the old Illinois and Michigan Canal.

On Wisner's Exhibit No. 8, I neglected to mention that the City of Chicago had removed and rebuilt a tunnel under the Chicago River immediately North of Van Buren street and indicated on this map as "West Chicago Street Railway tunnel." This prevented the deeping of the river for some time, as the top of the tunnel was about, as I remember, twenty feet below the surface, twenty or twenty-one feet below datum.

3435 The Sanitary District lowered the Kampsville Dam two feet and we attempted to lower the other one, but with the restrictions placed upon us by the Government we did not succeed in getting it down.

It was 1905 or 1906. And that was done pursuant to a permit from the Secretary of War.

HISTORY OF ROUTE OF NAVIGATION FROM LAKE MICHIGAN TO MISSISSIPPI, ACTS OF STATE AND FEDERAL GOVERNMENT CONCERNING ITS MAINTENANCE AND IMPROVEMENT, AND CONNECTION OF SANITARY DISTRICT'S DIVERSION WORKS WITH SUCH ROUTE.

History of the route.

By stipulation (Rec., Vol IV, p. 1813) the testimony of Professor Clarence W. Alvord, professor of history of the University of Illinois, Professor A. C. McLaughlin, professor of history of the University of Chicago and Dr. Reuben Golde Thwaites, secretary of the Wisconsin Historical Society, witnesses for the United States in the case of *United States* v. *Economy Light & Power Company* (involving the navigability of, and the jurisdiction of, the Secretary of War over the Des Plaines River) as given in that case, was introduced on behalf of the defendant Sanitary District of Chicago (Rec., Vol. IV, pp. 1814-1977).

The testimony of these witnesses established that the route now occupied by the main channel of the Sanitary District of Chicago between the Chicago River and the Des Plaines River was used from time immemorial as a route for trade and travel by water; that at a point now known as Riverside, which is approximately 39th street, Chicago, extended, where the Des Plaines River turned to the southwest, there was a small stream which in a state of nature before any improvements were made, flowed into the Des Plaines River from Mud Lake, a large stretch of water, which was from 300 feet to half a mile wide and from a mile to three or four miles in length, depending upon the wetness or dryness of the season; that in wet seasons from the easterly extremity of this marsh or Mud or Portage Lake, as it was called by the early settlers, was a stream flowing easterly, which was known as the West Fork of the South Branch of the Chicago River, so that in wet seasons

it was possible to pass in a boat from the Des Plaines River to Lake Michigan or from Lake Michigan to the Des Plaines River and in drier seasons it was at times necessary to make one or more portages in going to and fro between the Chicago River and the Des Plaines River; that this route through Mud Lake was the route (Rec., Vol. IV, p. 1814, *et seq.*) of the early explorers and the traders, trappers, and travelers who had reason to make a journey either way between the Great Lakes and the Illinois River. The exerpts set out in Volume IV show actual trips, maps, accounts of travelers, statements in public documents, contemporaneous histories, gazeteers, guide books, and the statements of individuals living on the route that the route was used as a highway for trade and travel.

Father Marquette stated that on his first voyage he came up, over this route using the Illinois River and Chicago portage to the Chicago River in 1673. (Rec. Vol. IV, p. 1816.)

Tonti, who was a lieutenant of the Cavalier de LaSalle, made use of this route in the winter of 1681. (Rec. Vol. IV, p. 1819.) The Cavalier de LaSalle himself came over the route on ice leaving the junction of the Des Plaines and Kankakee on the sixth of January, 1681, and again on the fourth of January, 1682. (Rec. Vol. IV, p. 1821.) Upon the death of de LaSalle, Father Membre and Abbe Cavalier, the brother of LaSalle, came up over this route in 1688. (Rec. Vol. IV, p. 1822.)

Father St. Cosme, in 1698, used this route from Chicago to the Des Plaines River and down the Des Plaines River to the Illinois River. (Rec. Vol. IV, p. 1826.)

Father Gravier writes that he used the route in September, 1700. (Rec. Vol. IV, p. 1829.)

John Baptiste Perrault made a trip from Chicago over to and down the Des Plaines River to Cahokia and returned over the same route in 1783. (Rec. Vol. IV, p. 1851.)

Hugh Heward, a Canadian, associated with the British fur trading houses, on May 9, 1790, describes in a diary kept by him, such a trip from Chicago across to the Des Plaines and down the Des Plaines River. (Rec. Vol. IV, p. 1852.)

Professor of History Clarence W. Alvord, of the University of Illinois, after having examined the various historical data, stated his conclusion to be that from the latter part of the 17th century through the first third of the 19th century, men engaged in the fur trade passed up and down the Chicago and Des Plaines Rivers in canoes and flatboats very regularly; that the fur trade was pursued by the French as long as they held possession of this country; was developed more fully by the English and later by the Americans; that the most active trade carried on the two rivers falls between the period of 1783 and 1825, or thereabouts; that the traders found a very easy passageway by means of these rivers in the early spring. That during the time of drought such as occurred in the summer or fall, the passage was hard, but even then they forced their boats through the waterway, often being obliged, however, to carry their packages around the shoals and rapids. (Rec. Vol. IV, p. 1929, 1930.)

Professor of History A. C. McLaughlin, of the University of Chicago, says:

> "Referring now to the period from the time of Charlevoix to the year 1825, and basing my answer upon the sources of historical information to which my attention has been specifically directed, assuming that as a historical writer I was preparing a history of Illinois, concerning the use of the Desplaines River, I should say that the Desplaines River was used with apparently considerable frequency as a route of trade and com-

merce; that at certain seasons of the year it seemed to have presented some difficulties, other seasons of the year it was used with considerable ease, and that it was a well known means of communication between the lake region and the lower Illinois and Mississippi." (Rec. Vol. IV, p. 1936)

Dr. Reuben Gold Thwaites, secretary of the Wisconsin Historical Society, states his conclusion on the same evidence as follows:

"Giving due weight to all the sources of information that I have examined my opinion is that from the latter part of the 17th century through the first third of the 19th century, men engaged in the fur trade with the western Indians actually and quite regularly passed up and down the Chicago and Desplaines Rivers in canoes and bateaux, Mackinaw boats and other boats propelled by oars, or poles, laden with merchandise and furs; that these traders and travelers found a comparatively easy passageway by means of these rivers in the early spring, and sometimes at other seasons; that during times of drought such as often occurred in the summer and fall on most of the western portage routes between the Great Lakes and the Mississippi (as, for instance, on the well-known and much used Fox-Wisconsin portage route) the passage was sometimes difficult; but even then these fur traders appear to have succeeded in forcing their boats over the Chicago-Desplaines waterway although perhaps, they were obliged here and there to make some carriage at that time of year, the length of the carriage varying greatly from season to season, and from year to year, according to the stage of water." (Rec. Vol IV. pp. 1947):

The Session of Virginia of 1783 of the Northwest Territory provided that the Northwest Territory shall

"be laid out and formed into states containing a suitable extent of territory not less than 100 nor more than 150 miles square, or as near thereto as circumstances will admit, and that the states so formed shall be distinct republican states and admitted members of the Federal Union, having the same rights of sovereignty, freedom and independence as the other states."

The Report of March 24, 1786, on the division of the Northwest Territory, adopted by Congress, among other things provided (Journals of Congress, Vol. IV, p. 663):

"Whereas it appears * * * that the laying it out and forming it into states of the extent mentioned in the resolution of Congress of the tenth of October, 1780, and in one of the conditions contained in the cession of Virginia, will be productive of many and great inconveniences; that by such a division of the country, some of the new states will be dperived of the advantages of navigation, some will be improperly intersected by lakes, rivers, and mountains, and some will contain too great a proportion of barren, unimproved land, and of consequence will not for many years if ever have sufficient number of inhabitants to form a respectable government, and entitled them to a seat and voice in the federal council: And whereas in fixing the limits and dimensions of the new states, due attention ought to be paid to natural boudaries and a variety of circumstances which will be pointed out by a more perfect knowledge of the country, so as to provide for the future growth and prosperity of each state, as well as for the accommodation and security of the first adventurers."

Article 5 of the ordinance of 1787 provided (p. 962):

"There shall be formed in the said territory not less than three nor more than five States; and the boundaries of the States, as soon as Virginia shall alter her act of cession and consent to the same, shall become fixed and established as follows, towit: The Western State, in the said terrritory, shall be bounded by the Mississippi, the Ohio and the Wabash Rivers; a direct line drawn from the Wabash and Post Vincents, due north, to the territorial line between the United States and Canada; and by the said territorial line to the Lake of the Woods and Mississippi. The middle State shall be bounded by the said direct line, the Wabash from Post Vincents to the Ohio, by the Ohio, by a direct line drawn due north from the mouth of the Great Miami to the said territorial line, and by the said territorial line. The eastern State shall be bounded by the last-mentioned direct line, the Ohio, Pennsylvania, and the said territorial line."

The following from 32 Annals of Congress, 15th Congress, 1st Session, April 3, 1818:

(P. 1677)

"STATE OF ILLINOIS.

The House resolved itself into a Committee of the Whole on the bill to enable the people of Illinois Territory to form a constitution and State government, and for the admission of such State into the Union on a footing with the original States.

Mr. Pope moved to amend the bill by striking out the lines defining the boundaries of the new States, and to insert the following:

> 'Beginning at the mouth of the Wabash river; thence up the same, and with the line of Indiana to the northwest corner of said State; thence east with the line of the same Sate to the middle of Lake Michigan; thence north along the middle of said lake to north latitude 42 deg. 30 minutes; thence west to the middle of the Mississippi river; and thence down along the middle of that river to its confluence with the Ohio river; and thence up the latter river along its northwestern shore to the beginning.'

The object of this amendment, Mr. P. said, was to gain, for the proposed State a coast on Lake Michigan. This would afford additional security to the perpetuity of the Union, inasmuch as the State would thereby be connected with the States of Indiana, Ohio, Pennsylvania and New York, through the Lakes. The facility of opening a canal between Lake Michigan and the Illinois river, said Mr. P., is acknowledged by every one who has visited the place. Giving to the proposed State the port of Chicago, (embraced in the proposed limits,) will draw its attention to the opening of the communication between the Illinois river and that place, and the improvement of that harbor. It was believed, he said, upon good authority, that the line of separation between Indiana and Illinois would strike Lake Michigan south of Chciago, and not pass west of it, as had been supposed by some geographers who had favored us with maps of that country; and, Mr. P. added, that all the country north of the proposed State, and bounded by Lakes Michigan, Huron, Superior and of the Woods, and the Mississippi river, must form but one State, Congress being restricted, by

the ordinance of 1787, from erecting more than five States in the Northwestern Territory.

This motion was agreed to without a division.

* * *

The Committe rose and reported the bill to the House, and it was ordered to be engrossed, as amended, and read a third ime, *nemine contradictente.*"

In an official report transmitted on December 28, 1819, to the House of Representatives by the then Secretary of War John C. Calhoun, is a report to the Secretary of War by Major Stephen H. Long, in which Major Long, said. (Rec. Vol. IV, pp. 1881, 1882):

"The river Desplaines is a small stream rising in the lowlands, bordering upon the west side of Lake Michigan and has its general course in a southwesterly direction. The Valley of this river has an average width of about one mile and is terminated on both sides by regular banks nearly parallel to each other, extending along the river about thirty miles from the head of the Illinois. In ascending this river, also the banks and bluffs gradually decrease in height being as before mentioned about one hundred feet high at the mouth and only 100 or 125 at the distance of thirty miles higher up the river, where, instead of maintaining their parallel direction, they form nearly right angles with the course of the river, that on the right taking an easterly, and that on left a northwesterly course; but, being gradually inflected from these courses, they form extensive curves encircling a large tract of flat prairie, in no part elevated more than twelve or fourteen feet above the common level of the water in this vicinity. The river, throughout the above mentioned distance has four or five short rapids or ripples that make their appearance only in times of low water. In every other part it has the appearance of being a chain of stagnant pools and small lakes, affording a sufficient depth of water for boats of moderate draught.

In the flat prairie, above mentioned, is a small lake, about five miles in length and from six to thirty or forty yards in width, communicating both with the river Desplaines and Chicago river by means of a kind of canal which has been made partly by the current of water, and

partly by the French and Indians for the purpose of getting their boats across in that direction, in time of
1882 high water. The distance from the river Desplaines to Chicago river by this water course is about nine miles through the greater part of which there is more or less water, so that the portage is seldom more than three miles in the driest season, but in the wet season boats pass and repass with facility between the two rivers."

REPORT OF R. GRAHAM, ASSISTANT SECRETARY OF WAR, AND
1884 JOSEPH PHILIPS, CHIEF JUSTICE OF ILLINOIS.

The next report attached to this same document is the report of R. Graham and Joseph Philips. Philips was one who accompanied this expedition of Major Long and made a report likewise on the subject. He was the first Chief Justice.

The said report of Graham and Philips of April 4, 1819, in part is as follows:

1885 "It was, however, determined, from certain data, that the level of the river was two feet, or thereabouts, above the level of the lake. From this view it would seem that the cutting of a canal in this place between the Plein and the Lake would be a work of neither skill, difficulty or expense. Small, however, as the labor would be under this view it is still diminished upon a close examination, and by finding that an arm of the lake called Chicago puts out in the direction of the Plein and that an arm of the Plein, also called Chicago, puts out in the direction of the lake. They approach within two miles of each other; so that, in common water, there is only dry ground to that extent between them. The character of these two arms is essentially different; that of the lake being about sixty feet wide, and from ten to forty feet deep; that of the river, being in high water, from four to six feet deep, and in, places a mile wide, and, in low water, either dry or reduced to a gutter. Between the heads of these two arms is also a gutter, which is dry in the dry seasons of summer and fall, and full of water in the spring, and, when thus filled with water, the boats, of six or eight tons, engaged in the Mackinaw and Mississippi trade, run through, backwards and forwards, so as to make no portage between Mackinaw and

the Mississippi. This gutter, judging from the appearance of others now forming, was, at first, a path worn out by the feet of those who carried things across the
1886 portage, and afterwards deepened by the attrition of the waters until formed into a little canal. The wind, alone, gives the water a current in this little canal, and its direction depends upon the course of the wind. Objects have been seen to float out of it from the same point to the river and to the lake.

It is incontestably true, that an east wind will drive the water of the lake through this gutter into the Plein, and that water from Lake Michigan has been discharged by this outlet into the Mississippi, and thence into the Gulf of Mexico. It is equally incontestable, that the waters of the Plein have been driven, by the same channel, into the lake; and these phenomena may now be witnessed, at any time, when the waters are high and the wind blows hard. It follows, therefore, that to finish the canal began by nature, in this place, would require, as we have already said, but little of skill, time or expense."

In 1795, Anthony Wayne, Major General of the United States, made a treaty of peace, known as the Treaty of Greenville, with the several Indian tribes then living in the Northwest Territory (Illinois, Indiana, Ohio, Michigan and Wisconsin) which provided for a free passage by water over this water route between the Chicago River and the Des Plaines River. (Rec. Vol. IV, p. 1861, 1862):

In 1816 the United States made a treaty of peace with the Ottawa Indians whereby the land in which the Sanitary District Canal is now located was ceded to the United States. (Rec. Vol. IV, p. 1874):

Right of Navigating St. Lawrence by citizens of the United States denied by Great Britain.

By acts of Parliament in 1822 and 1824 the British Government denied the citizens of the United States the free navigation of the St. Lawrence between the Great Lakes and the Sea.

In a communication between Minister Rush and Mr. Adams, Mr. Rush, says (Rec. Vol. IV, p. 2276):

Extracts from Message of the President of Jan. 7, 1828, State Papers 1st Session 20 Congress, Vol. 2, Doc. 43, Page 8, entitled "Extract of a Dispatch from Mr. Rush to Mr. Adams, Dated London, August 12, 1824."

"The act of parliament of August 5, 1822, having immediate relation to the commercial intercourse between the United States and the British continental possessions in their neighborhood, I naturally regarded it as your instructions to me had done in connection with the act of June 24, 1822. This brought under consideration our claim to the navigation of the St. Lawrence. Between this question and the questions of commercial intercourse under the act of June, 1822, the British plenipotentiaries were constantly unwilling to acknowledge any connection. Nevertheless, looking to your instructions, and as well to the reason of them as to their authority, I treated the two questions as belonging to one and the same general subject. They asked whether, taking the two acts of parliament together, the United States did not already enjoy the navigation of this river? I said that they did; by the act of June 24, 1822, they enjoyed it from the ocean to Quebec; and by that of August 5, 1822, from any part of the territories of the United States to Quebec. But from the fact of the colonial government in Canada being invested with a discretionary power to withdraw the latter of these concessions by excepting any of the Canadian ports from those to which our vessels were made admissible, it followed that our enjoyment of the navigation of this river was rendered contingent upon British permission."

The negotiations began by Mr. Rush were concluded by Mr. Gallatin and resulted in the refusal of the British to permit longer the free navigation of the St. Lawrence River. Mr. Gallatin say (Rec. Vol. IV, p. 2294):

EXTRACT OF LETTER FROM MR. GALLATIN TO MR. CLAY, DECEMBER 21, 1827.

"The British plenipotentiary will not entertain any proposition respecting the navigation of the St. Lawrence founded on the right claimed by the United States to navigate that river at the sea."

EXTRACT OF LETTER FROM MR. GALLATIN TO MR. CLAY, OCTOBER 1, 1827.

"The British plenipotentiary reply that however well disposed Great Britain might be to treat with the United States respecting the free navigation of the St. Lawrence as a question of mutual convenience, yet the views of the British government, being the same now as they were in 1824, and they being prohibited by express instructions from entering into any discussion respecting the free navigation of the river, if claimed as heretofore by the United States on the ground of right, they could not entertain any proposition to that effect if now made by me. * * *"

Acts of Federal Government and Illinois concerning establishment, maintenance and improvement of Illinois Michigan Canal.

On March 30, 1822, the Congress of the United States passed an act authorizing the State of Illinois to open a canal to connect the Illinois River with Lake Michigan, which act provided among other things, as follows (Rec. Vol. VIII, p. 67):

"Act of March 30, 1822

(3 U. S. Stat. at Large, p. 659)

An Act to Authorize the State of Illinois to Open a Canal Through the Public Lands to Connect the Illinois River with Lake Michigan. (Approved and in force March 30, 1822.)

Section 1. Be it enacted by the Senate and the House of Representatives of the United States of America, in Congress Assembled: That the State of Illinois be, and is hereby authorized to survey and mark, through the public lands of the United States, the route of the canal connecting the Illinois River with the southern bend of Lake Michigan; and ninety feet of land on each side of said canal shall be forever reserved from any sale to be made by the United States, except in the cases hereinafter provided for, and the use thereof forever shall be, and the same is hereby vested in the said State for a canal, and for no other purpose whatever; on condi-

tion, however, that if the said State does not survey and direct by law said canal to be opened, and return a complete map thereof to the treasury department, within three years from and after the passage of this act; or, if the said canal be not completed, suitable for navigation within twelve years thereafter; or, if said ground shall ever cease to be occupied by, and used for, a canal suitable for navigation; the reservation and grant hereby shall be void and of none effect; Provided, always, and it is hereby enacted and declared, that nothing in this act contained, or that shall be done in pursuance thereof, shall be deemed or construed to imply any obligation on the part of the United States to appropriate any money to defray the expenses of surveying or opening said canal; **Provided, also, and it is hereby further enacted and declared, that the said canal, when completed, shall be and forever remain a public highway for the use of the Government of the United States, free from any toll or other charge whatever, for any property of the United States, or persons in their service passing through the same."**

In 1826 the legislature of Illinois petitioned the Congress of the United States for an additional act for the construction of a canal. The other act of 1822 had ceased to have any force or effect because of the failure of the state to act within the time required. (Rec. Vol. IV, p. 2017.)

MEMORIAL OF ILLINOIS.

"The memorial of the General Assembly of the State of Illinois respectfully represents: That the construction of a canal, uniting the waters of Lake Michigan with the Illinois river, will form an important addition to the great connecting links in the chain of internal navigation, which will effectually secure the indissoluble union of the confederate members of this great and powerful Republic."

In 1827 the Congress of the United States passed an additional act authorizing the opening of the canal and the granting of public land to the State of Illinois in aid of such a project. The act is as follows (Rec. Vol. VIII, pp. 68, 69):

ACT OF MARCH 2, 1827.

"(4 U. S. Stat. at Large, p. 234)

An act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan. (Approved and in force March 2, 1827.)

Section 1. Be it enacted by the Senate and House of Representatives of the United States of America, in Congress Assembled, That there be and hereby is granted to the State of Illinois, for the purpose of aiding the said State in opening a canal to unite the waters of the Illinois River with those of Lake Michigan, a quantity of land equal to one-half of five sections in width, on each side of said canal, and reserving each alternate section to the United States, to be selected by the Commissioner of the Land Office, under the direction of the president of the United States, from one end of the said canal to the other; and the said land shall be subject to the disposal of the Legislature of the said State, for the purpose aforesaid, and no other; Provided, *That the said canal when completed, shall be and forever remain a public highway for the use of the Government of the United States, free from any toll, or other charge, whatever, for any property of the United States, or persons in their service passing through the same;* Provided, That said canal shall be commenced within five years and completed in twenty years, or the State shall be bound to pay to the United States the amount of any lands previously sold, and that the title to purchasers under the State shall be valid.

(Duty of the Governor of the State when the canal is located, etc.)"

On January 9, 1836, the State Legislature of Illinois passed an act for the construction of the Illinois and Michigan Canal. Record Vol. IV, pp. 2295-2304. Section 16 of said act provided as follows (Rec. Vol. IV, p. 2298):

"SEC. 16. (DESCRIPTION—PROVISO.) The said canal shall not be less than forty-five feet wide at the surface, thirty feet at the base and of sufficient depth to insure a navigation of at least four feet, to be suitable for ordinary canal boat navigation, to be supplied with water

from Lake Michigan and such other sources as the canal commissioners may think proper, and to be constructed in the manner best calculated to promote the permanent interest of the country; reserving ninety feet on each side of said canal, to enlarge its capacity, whenever in the opinion of the board of canal commissioners, the public good shall require it; *provided,* that all persons who have purchased, or shall hereafter purchase lands fronting the said canal shall be permitted to lease from the said board the said reserved ground on each side of said canal, from year to year, or until the said ground shall be wanted to enlarge the capacity of said canal, for the best price that can be obtained to be paid into the canal fund."

Physical and health conditions at Chicago.

The physical conditions prior to the projection of the Sanitary District works are stated in the testimony of Lyman E. Cooley (Rec. Vol. III, pp. 1710, 1711) as follows:

The Chicago River basin, as it originally existed in nature, consisted of the North Branch and its drainage basin, together with the South Branch, an area of about 240 square miles (now about 300 square miles). West of the Chicago River basin, was the Des Plaines River basin, drained by the Des Plaines River which ran parallel to the lake from the headwaters in Wisconsin down to a point about ten miles from Lake Michigan at Lyons; and then leading southwesterly to a junction with the Illinois River, or to the junction with the Kankakee River, which formed the Illinois.

This Des Plaines River, in the vicinity of Lyons, had a low water elevation of about eight feet, and a drainage area of 633 square miles.

The divide between the Des Plaines River and the Chicago River was in the vicinity of the Bridewell, just west of Kedzie avenue, and had an original elevation of about 10½ feet above Lake Michigan, and whenever the Des Plaines River rose from two or three feet above low water, or exceeded a volume of about 1,000 second feet, the flow of the

river divided, part of it coming through the South Branch of the Chicago River to Lake Michigan, and in great floods sixty to seventy per cent of the entire flow of the Des Plaines River came to Chicago.

This condition existed up to about 1854, after the Illinois and Michigan Canal had been opened in 1848, when the Drainage Commissioners cut out the original divide at Kedzie avenue and drained out the Mud Lake region as it was known in Voyageur's days, and on the original land maps as "Portage Lake, Portage Swamp, and Portage Slough."

For a number of years thereafter, the entire flow of the Des Plaines River came in the direction of Chicago except at such times as in the fall and winter when the ice interests of the Des Plaines River Valley made a temporary dam in order to fill the ponds on the twelve-mile level between Summit and Lemont, for ice-making purposes.

Finally the flow from this source became such a nuisance to the City of Chicago that after 1870 they constructed the Ogden-Wentworth Dam. That crossed the old Portage Slough at the range line at Summit, at an elevation of something over eleven feet above Chicago datum. And this was overflowed also, whenever the river rose above a volume of about 1,000 feet per second; and the waters continued to come this way in flood times when the volume exceeded that amount until 1893 when the Sanitary District executed its river 1711 diversion and created a spill-way above Summit, which restricted the flow down the river until the volume reached between 3,000 and 4,000 feet per second. And in about 1909, this was finally closed, so that no waters from that source have come through the Chicago River to Lake Michigan since.

The effects of this overflow have been most pronounced and is noted from time to time in the narratives relating to Chicago and its portage.

The Illinois and Michigan Canal was constructed and opened in 1848. Lyman E. Cooley (Rec. Vol. III, p. 1713) testified as follows:

There was another event happening about this time, the opening of the Illinois and Michigan Canal in 1848. The first shovel had been thrown on this canal at Bridgeport within the present city limits July 4, 1836; and that had contributed greatly to the growth of Chicago during its construction."

In 1861 the Illinois Senate and House of Representatives passed a joint resolution with reference to a survey of the Illinois, Des Plaines and Chicago Rivers for the purpose of improving navigation from Chicago to the mouth of the Illinois River. (See Laws of Illinois, 1861-63, p. 277.)

"RESOLVED BY THE SENATE, THE HOUSE OF REPRESENTATIVES CONCURRING HEREIN, That the board of trustees of the Illinois and Michigan Canal be and are hereby authorized and instructed to cause prompt and thorough surveys, examination and estimates to be made of the Illinois River, and of the Illinois and Michigan Canal, and also of portions of the Desplaines and Chicago rivers, and of the portage between said rivers, for the purpose of accurately ascertaining the comparative value, cost, efficiency, benefits, and advantages, direct, prospective and incidental, of the different methods proposed or desirable for improving the navigation of the Illinois River, by dredging or excavation of the channel and wing dams, *or by supplying water from Lake Michigan, through the enlargement and deepening of the Illinois and Michigan Canal, or otherwise, or by opening a channel from Lake Michigan, by way of the south branch of the Chicago river and Mud Lake to the Desplaines river, and down said canal to a point that will secure a free, flowing, ample and never failing supply of water, sufficient for the navigation of the Illinois river at all seasons and times,* when not obstructed by ice.

* * *

and to include also an estimate for the channel hereinbefore mentioned, of sufficient size to admit of full and free steamboat navigation from the Illinois river to Chicago and Lake Michigan, *as well as a size sufficient for supplying water for all the deficiencies of navigation in the Illinois river, at all seasons.* * * *"

The Illinois and Michigan Canal originally was built upon the shallow cut plan and did not take water from Lake Michigan by gravity flow at first. Mr. Cooley testified (Rec. Vol. III, p. 1716) as follows:

The Illinois and Michigan Canal, as it was finally completed under the canal trustees, had a summit level eight feet above Lake Michigan, and it was fed in ordinary seasons from the Des Plaines River and by a feeder through the Sag Valley and the Calumet River at Blue Island.

That was known as the Shallow Cut Plan.

A dam was built across the Calumet River at an elevation of eleven feet above Chicago datum. This was insufficient in the dry seasons, and a Dutch wheel or lift wheel was erected at Bridgeport, at the forks of the Chicago River and at the head of the canal for the purpose of supplementing the feed water of the canal, and in such seasons that was sufficient in cleansing the Chicago River and as I have stated, these were operated for that purpose in the later fifties.

But in 1863, after Chicago had established a Board of Public Works, the Chicago River became very offensive. An erysipelas epidemic occurred, which was co-terminus with the South Branch and was attributed to the blood and other matters from the slaughtering houses, and it was depicted on the spot maps as the "Valley of Death."

The Board of Public Works at that time made an arrangement with the Canal Trustees by which the Bridgeport Pumping Station should be operated and the city would contribute to the cost of doing so for the purpose of cleansing the Chicago River; and that arrangement continued up to the time that the canal deepening was completed in July, 1871.

That was completed then on the Deep Cut Plan.

On April 16, 1865, the State of Illinois passed an act to provide for the completion of the Illinois and Michigan Canal upon the plan adopted by the state in 1836 which authorized the City of Chicago to deepen the Illinois and Michigan Canal

in order to purify and cleanse the Chicago River by withdrawing a greater quantity of water from Lake Michigan. Said act is as follows (Rec. Vol. VIII, pp. 70, 71):

"An Act to Provide for the Completion of the Illinois and Michigan Canal upon the Plan Adopted by the State in 1836. (Approved February 16, 1865, in Force April 16, 1865.)

(Preamble.)—Whereas, it has been represented that the City of Chicago, in order to purify or cleanse Chicago River, by drawing sufficient quantity of water from Lake Michigan, directly through it, and through the summit division of the Illinois and Michigan Canal, would advance a sufficient amount of funds to accomplish this desirable object; and,

Whereas, the original plan of the said canal was to cut down the summit so as to draw a supply of water for navigation directly from Lake Michigan, which plan was abandoned for the time being, after a large part of the work had been executed, only in consequence of the inability of the State to procure funds for its further prosecution; and,

Whereas, under the law creating the trust the plan of the summit division of the canal was changed, the level being raised so as to require the principal supply of water to be obtained through the Calumet feeder, subject to serious contingencies, and by pumping on to the summit with the hydraulic works at Bridgeport; now, therefore,

(Summit Division to Be Completed.)—Section 1. Be it enacted by the People of the State of Illinois, represented in the General Assembly: That to secure the completion of the summit division of the Illinois and Michigan Canal, upon the original 'deep cut' plan, with such modifications and changes of line, if necessary, as will most effectually secure the thorough cleansing or purification of the Chicago River, and facilitate the execution of the work, the City of Chicago, through its constituted authorities, may at once enter into an arrangement with the board of trustees of said canal, with a view to the speedy accomplishment of the work.

(Opening and Closing of Canal.)—2. The canal shall not be constructed of a less capacity than the plan adopted by the canal commissioners in 1836, nor shall the work of deepening it be prosecuted so as to materially interfere with the navigation. By consent of the board

of trustees, however, the navigation may be opened later and closed earlier than usual in former years, but it shall never be diminished to a less time than six months.

(Right of Way.)—3. It shall be lawful for the City of Chicago to enter upon and use any lands which may be necessary for the right of way for said canal, if the route should in any part vary from the present line of canal, and to take and use any materials of any description, necessary for the prosecution of the work contemplated, along the line thereof; the value of the same to be determined in the mode provided by the general laws of this State."

February 12, 1867, in an official report made to the Chief of Engineers of the War Department of the United States by Major Gen. J. H. Wilson, United States Engineer, who had been instructed to make a survey of the Illinois River, pursuant to the Act of Congress, June 23, 1866, Major Gen. Wilson said (Rec. Vol. IV, p. 2242):

"The Illinois River seems to have been specially designed by nature as the line by which the waters of Lake Michigan are to be connected with those of the Mississippi. Its two principal tributaries, the Des Plaines and the Kankakee, rising the one in Wisconsin and the other in Indiana, run for many miles almost parallel with the western and southern lake shore, and are separated from the lake basin by a ridge of insignificant height and width. A moment's consideration will show that at no remote period the waters of the lake must have been carried off by these streams as well as by the St. Lawrence. It has been already shown that the highest point of this ridge on the line of the Illinois and Michigan Canal is only 14 feet above the ordinary level of the water in the Chicago River at Bridgeport, and it is by no means certain that a lower line may not be found by a careful survey. In fact, it is the opinion of many old contractors who are well acquainted with the entire region, that a much more favorable location for a steamboat canal can be obtained from Bridgeport to Section 46 of the present canal, by following the line through Mud Lake. But let this result be as it may, the data herein contained, together with the existence of a canal of limited capacity already in operation, demonstrate beyond a doubt that the waters of the lake may be carried into the Illinois River through a navigable

channel of any required dimensions, and at a cost which cannot be regarded as excessive when the objects to be obtained are duly considered.

As all the lockage will be descending from the lake, it is apparent that the only limit to the capacity of the canal will be that which depends upon the velocity with which the locks can be filled and emptied. The summit will be inexhaustible, and this cannot be said of any other practicable line of water communication between Lake Michigan and the Mississippi."

The Deep Cut plan for the Illinois and Michigan Canal was carried out and completed in 1871 by the City of Chicago, to take more water from Lake Michigan by gravity as stated by Mr. Cooley (Rec. Vol. III, pp. 1718, 1719) as follows:

Meantime, a Commission had proposed the deepening of the Illinois and Michigan Canal on the original deep cut plan; and in 1865 an enabling act was procured from the General Assembly which authorized the City of Chicago to deepen this canal on the original plan for sanitary purposes; and the City of Chicago did so, and expended thereon about $3,000,000 in cash and opened the same in July, 1871.

Pursuant to the River and Harbor Act of 1875, Col. J. N. Macomb, made a report to the Chief of Engineers and by him transmitted to Congress, in which he said (Rec. Vol. IV, pp. 2243, 2244, 4748-4750):

"Report of Colonel J. N. Macomb, Corps of Engineers.

Rock Island, Ill., January 25, 1875.

General: I have the honor to present herewith the report of Mr. F. C. Doran, assistant engineer, who was charged by me with the duty of making the surveys and estimates for the Hennepin Canal Route, and particularly for the extension to Chicago.

In considering the Hennepin Canal as a part of the water-communication desired for connecting some point of the Mississippi River near Rock Island, with Lake Michigan, at Chicago, it appears that the basin at Hennepin is about 100 feet below the level of the Mississippi River in the vicinity of Rock Island, and nearly 140 feet below the level of Lake Michigan.

2244 • • •

The improvement of the eastern portion of the Illinois and Michigan Canal involves the further cutting down of the summit level and enlarging the waterway so as to afford an unfailing supply of water from Lake Michigan for the improved Illinois River.

Report of Mr. F. C. Doran, Assistant Engineer.

Rock Island, Ill., January 9, 1875.

Page 96.

Colonel: I have the honor to submit the following report upon the examination and survey of a route for a canal between Lake Michigan and the Mississippi River, together with the survey of a portion of the Illinois River. * * *

2247 Page 97.

Prior to the year 1872, the summit-level of the Illinois and Michigan Canal was some 8 feet above the standard-level of Lake Michigan, and the quantity of water requisite to maintain navigation on the summit-level of the canal was supplied from Lake Calumet by a feeder and from the Chicago River by expensive pumping-machinery.

Sometime during the year 1866, the Board of Public Works of the City of Chicago entered into a contract with the State to cut down and reduce the summit-level of the canal to the elevation of the lake.

The object of this work on the part of the city authorities was to obtain an outlet for the south branch of the Chicago River; that being a receptacle for the sewerage of a large part of the city.

This contract was satisfied, the work completed, and navigation on the canal resumed July 18, 1872. The exertions and labors of the city to rid itself of a nuisance were not in vain; the residents of the city were relieved of a truly great evil, and the problem of securing a permanent and ample supply of water for the canal was practically solved.

Happy as such results were, the work, from its con-
2248 tracted dimensions afforded only partial relief; and recent drainage improvements in the vicinity of the city have proved quite detrimental to and interfered very seriously with the city's purposes and interests in respect to this work.

In view of the many benefits that would accrue to the city in case of a further enlargement of this canal, as contemplated, the question is believed to be pertinent, will the city assume her portion of the cost of such enlargment?

One of the important duties of this survey was to determine accurately the volume of water to be drawn from the lake to maintain a depth of water in the river after it should be improved.

Experience on the summit-level of the canal, since it has been supplied from the lake, proves conclusively that the varying stages of water in the lake very materially affect navigation on this part of the canal. This fact is more noticeable during periods when the direction of the wind is parallel with the axis of the canal; the fluctuations in the elevation of the surface of the water being directly traceable to this cause."

In an extract from U. S. Chief of Engineer's Report, 1880, made pursuant to Rivers & Harbors Act of March 3, 1879, Appendix EE, Page 1995, survey of Illinois River, Major G. J. Lydecker said (Rec. Vol. IV, p. 2248):

"United States Engineer Office.

Chicago, Ill., May 10, 1880.

General: I have the honor to submit the following report on a survey of the Illinois River, executed in pursuance of the act of Congress making appropriations for the improvement of certain rivers and harbors, approved March 3, 1879.

The question of a through line of water communication from the Mississippi to Lake Michigan, via the Illinois River, has been before Congress since an early date. In 1822, the State of Illinois was authorized to make through the public lands of the United States a route for a navigable canal connecting the Illinois River with Lake Michigan, and between that date and 1854, Congress had granted to the State 321,760 acres of land to assist in its construction. The canal was first opened to navigation in 1848, its cost up to that time being $6,409,509.95; since then the state has spent a great deal towards its enlargement and maintenance. In the meantime several surveys, having in view the improvement of the Illinois River, have been made, the first in 1838 by Capt. Howard

Stansbury, Topographical Engineers; the next of any considerable importance was made under the direction of General J. H. Wilson, in 1866, the object of which was 'to obtain such specific and accurate information in
2249 regard to obstructions to navigation in that river as will enable you to submit estimates for its improvement, so that the largest boats navigating the Illinois and Michigan Canal, and steamboats drawing four feet of water, will be enabled to pass through the river to St. Louis during the season of extreme low water without breaking cargo.'

His report on this survey led Congress to direct a more complete survey in 1867 (act approved March 2), the object of which was to prepare plans and estimates 'for a system of navigation by way of the Illinois River, between the Mississippi and Lake Michigan, adapted to *military, naval,* and *commercial* purposes.' This duty was committed to a Board of Engineers composed of General J. H. Wilson and Mr. William Gooding, Civil Engineer, the latter having been for a long time the Chief Engineer of the 'Illinois and Michigan Canal.' The report of this Board was submitted to the Chief of Engineers under date of December 17, 1867, and is published in his annual report for 1868, pages 438 to 468. It recommended that the Illinois River be improved by the construction of five locks and dams, creating thereby a slack water system with a navigable depth of 7 feet at the lowest stage, from the mouth of the river at Grafton to Utica, 227 miles above; the lock chambers were to be 350 feet long, 75 feet wide, and the estimated cost of the entire work was $1,953,600. To complete the through line to Lake Michigan, an enlargement of the canal was recommended, the estimated cost of this enlargement being, in round numbers, $16,250,000.

No appropriations were made by Congress to carry out the plan of improvement above indicated, but the State of Illinois, in substantial conformity with that plan, has constructed *two* of the proposed locks and dams (viz, at Henry and Copperas Creek), at a cost of $747,747, while the annual appropriations by Congress for improving the Illinois River (aggregating to date $589,150) have been applied mainly to ameliorating its navigable condition by dredging channels through the worst bars, and constructing dikes and wing-dams for contracting the waterway. For a more detailed description of these operations I would respectfully refer to my report dated

August 30, 1878 (which was published as House Ex. Doc. No. 81, 45th Congress, 3rd Session), a copy of which is transmitted herewith.

The several surveys and reports above referred to
2250 gives so complete a description of the physical characteristics of the route, and present the arguments in favor of its improvement so forcibly, that it seems unnecessary to extend this report by repeating what has been so fully set forth before; accordingly it is limited to a brief outline of operations on the last survey, and a statement of what is necessary to complete the improvement of the river.

A substantial improvement having been effected from its point of connection with the canal down to Copperas Creek Lock, it was decided to apply the $5,000 allotted for our survey to the remainder of the river, viz, from Copperas Creek to Grafton, where the Illinois empties into the Mississippi.

* * *

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The laws of Congress require that reports of surveys of rivers and harbors shall contain 'statements of all existing facts tending to show to what extent the general commerce of the country will be promoted by the several works of improvements contemplated by such examinations and surveys.' In fulfillment of this requirement, it seems only necessary to note that the improvement of the Illinois River, supplemented by the enlargement of the Illinois and Michigan Canal as heretofore proposed, will furnish a reliable and commodious channel of water communication from the Mississippi River to the Northwestern lakes; by this time the vast Mississippi Valley, and all the country tributary thereto, is brought into direct water communication with Lake Michigan, at the great City of Chicago, with its flood of commerce eastward and westward; the route exists as a practicable one of considerable importance today, and the question is simply one of enhancing its value by increasing its capacity to a degree commensurate with the important interests involved.

Other routes have been examined and studied with care but neither of them occupies so central a position, can be built so soon, and with such certain results, maintained so economically, nor utilized through so great a part of the year.

Considering this simple statement, the facts so fully set forth in previous elaborate reports, and noting the wonderfully rapid development of the entire western country, it would seem that nothing further is necessary to indicate 'to what extent the general commerce of the country will be promoted' by the contemplated improvement, nor to show how desirable it is that the work should be accomplished with the least delay practicable."

In 1881 the State of Illinois passed a resolution authorizing City of Chicago to furnish the canal with 60,000 cubic feet of water per minute by means of pumps. (Rec. Vol. VIII, pp. 72, 73; this Narrative, p. 49.)

January 30, 1887, the Drainage and Water-Supply Commission rendered a report, in which the resolution of the City of Chicago City Council authorizing the Commission and the appointment by the mayor are set out as well as the findings of the Commission.

Said report is as follows (Rec. Vol. I, pp. 496-522):

"Chicago, January 30, 1887.

To the Honorable Mayor and City Council of the City of Chicago:

Gentlemen: On January 27, 1886, your honorable body passed a resolution authorizing the creation of a drainage water-supply commission. After being amended, February 23, it read as follows:

Whereas pure water and scientific drainage are necessities of this community, and the people demand a system of water supply and drainage adequate to meet the requirements not only of the present, but of years to come, nor will any temporary expedient or makeshift satisfy them; and

Whereas a thorough and permanent system of supplying pure water to our citizens and caring for the drainage of the municipality can not be paid for out of current taxation, therefor it is desired that a plan shall be devised and perfected before the next meeting of the legislature to the end that necessary legislation may be had.

For the purpose of carrying into effect the objects sought, there is recommended the appointment by the Mayor of a commission to consist of one expert engineer, whose reputation is so high that his opinion and report will command the respect of the community, and with him one or two consulting engineers of like experience in engineering and sanitary matters. The duty of this drainage and water supply commission, made up as above set forth, should be to consider all plans relating to drainage and water supply which may be brought to its attention; to make such examinations and investigations and surveys as may be deemed necessary; to collect all information bearing on this problem; to consider all recent developments in the matter of sewage disposal, and their
497 application to our present and future needs; to consider and meet necessity of increasing our water supply and of protecting the same from contamination; to remedy our present inadequate methods of drainage and sewage disposal; to consider the relations of any system proposed to adjacent districts, and whether there may not be a union between the city and its suburbs to solve the great problem; to determine the great question as to the interest which the State and the United States may have in the disposal of sewage by way of the Illinois River, and to devise plans to meet any objections thereto, if such a system shall be thought best; and in general to consider and report upon any and all things which relate to the matter of water supply and drainage of the City of Chicago.

The commission should report on the whole matter committed to it in the most full and comprehensive manner, with maps, plans, and diagrams complete, and accompany the report with estimates of the first cost and annual requirements for the maintenance of the system proposed.

The report of the commission should be made as early as practicable, and not later than the convening of the next session of the Illinois legislature, in January, 1887.

In consideration of the foregoing, be it,

Resolved, That the Mayor be, and is hereby, authorized and directed to employ on behalf of the city one expert engineer of reputation and experience in engineering and sanitary matters, at a salary not to exceed $10,000 per annum, and also to employ such consulting engineers, not exceeding two in number, as may seem necessary, and such assistant engineers as may be re-

quired, all to be paid according to services rendered, for the purpose of carrying out the objects set forth in the preamble hereto. For the fees of said assistant engineers and for all expenses connected with said work there shall be allowed not to exceed the sum of $20,000. All fees, salaries, and expenses connected with said work shall not exceed in the aggregate the sum of $30,000, and the same shall be paid from the water fund of the city upon vouchers audited by the Mayor and city comptroller.

In accordance with the terms expressed herein his honor, Carter H. Harrison appointed Rudolph Hering as chief engineer, Benezette Williams and S. G. Artingstall
498 as consulting engineers, who together should constitute a commission. Mr. Hering entered upon duty March 28, Mr. Williams September 17, and Mr. Artingstall December 21, 1886.

The investigation designated by the resolution was a formidable one, composing no less a task than the consideration of the entire subject of the future water supply and drainage of Chicago. It appeared doubtful from the beginning that a report such as was demanded could be furnished within the specified time, for the simple reason, if for no other, that observations of the lake phenomena and of the flow of certain rivers should be extended over at least one year, covering four consecutive seasons, in order to draw satisfactory deductions.

But the large amount of work alone that was asked for made it impracticable to present a complete report in so short a time. It was expected, however, that results could be reached sufficient to indicate the character of legislation required to carry out any project that might be determined upon, and that therefore a preliminary report having this end in view could be made at the stated time, leaving to a later date the presentation of a report outlining the detailed features of the scheme recommended and embracing the minor results of the entire inquiry.

The present communication is to cover the ground indicated for the preliminary report, and besides containing the conclusions reached regarding the main features of the proposed project, it contains also a brief review of the work done during the past year and of what still remains to be done.

The month of April was devoted to a general examination of the subject of the territory to be investigated, and

of the various suggestions that had been made toward effecting a solution of the problem.

The examination disclosed the fact that the city is sometimes greatly suffering from the offensive condition of parts of the Chicago River and its branches, caused by the discharge of sewage into the same, and from the occasional contamination of its water supply, brought about by the discharge of the polluted contents of the river into the lake. It also disclosed the fact that almost every conceivable way of dealing with these questions had been suggested and in some forms applied during the past thirty years.

[The problem therefore demands the attainment of two
499 ends—the protection of the water supply and the removal of the river nuisance. As the water must be taken from the lake, it is evident that both its pollution and the objectionable condition of the rivers should be prevented by a better disposition of the sewage. It is, therefore the latter question which constitutes the main object of this investigation.

Among the possible methods of getting rid of the Chicago sewage there are but three that have been deemed worthy of an extended consideration, namely: A discharge into Lake Michigan, a disposal upon land, and a discharge into the Des Plaines River. The preliminary work has, therefore, been confined to these three projects, and was classed as topographic, hydrographic, and miscellaneous.]

At the time when the present commission began its labors the topographical work had already received some attention. Surveys were being made of the Des Plaines River from Bridgeport westward under the direction of Mr. Artingstall, city engineer. These surveys were continued, and have now been completed as far as Joliet. They include contours of the entire valley and borings to rock between Bridgeport and Lemont. In order to understand the hydrography of the Des Plaines Valley above the point where the Chicago sewage could be discharged into it, and also to ascertain the probable magnitude and effect of floods in the river, a survey was made of its bed as far north as Northfield township. To determine the area of the basin its entire divide was located. To ascertain the practicability of diverting the flood waters from the upper portion of the Des Plaines and North Branch water sheds directly into the lake, and thus avoiding the difficulties which would arise from their passing

through the Chicago River, all feasible lines were surveyed. Finally, a few levels were taken of the area adjoining the city wherever no connected levels existed to show the general topographical features of the territory over which the future city will spread out and from which the drainage will require artificial removal.

[The hydrographic work consisted in ascertaining the flow of the Des Plaines River, the rainfall upon its area, its flood discharges, the character of its bed, and the probable effect of discharging the Chicago sewage into it when diluted by a large and constant stream of water from the lake. It consisted, further, in examining the
500 nature of the currents in the lake and in studying the rise and fall of its level, and in ascertaining the amount and character both of the sewage discharged into it and of the deposits in the river and lake in front of the city to determine the effects of the present sewage disposal.

Inquiry and surveys were made to show the feasibility of purifying the Chicago sewage by filtration on land.] Land damages were carefully estimated for the different schemes; existing records were searched concerning borings and excavations made in and about the city, so that the practicability of certain lines of tunnels could be discovered; the probable growth of the city and its suburbs, as well as the probable distribution of the future population, received a careful attention, and, finally, a large number of data were compiled which pertain to the existing works of water supply and sewerage in Chicago and the adjoining towns.

In reporting the result thus far gained we will present them in the order most convenient for discussion, but before doing so will briefly describe the present manner and effect of the sewage disposal, as shown by this investigation.

Present Sewage Disposal.

The sewage works of Chicago and suburbs have been planned on what is called the combined system, in which the sewers serve for the removal both of sewage and rain water. In the town of Evanston they empty into the lake. In the town of Lake View they partly discharge into the lake and partly into the North Branch. From the north and west divisions and part of the south division of Chicago, the drainage enters the Chicago River and its branches, and from the remaining part of the

south division it flows into the lake at three outlets, situated respectively, at Twelfth, Twenty-second, and Thirty-fifth streets. The sewers of Hyde Park discharge into the lake excepting those of Pullman, where the sewage is disposed of on land. The town of Lake, including the Stock Yards district, drains into the South Fork of the Chicago River.

When the sewage works of this city were designed, in 1856, by Mr. E. S. Chesbrough, it was apprehended that ultimately some means would have to be found to change the water in the river from time to time or to keep the sewage entirely out of it. The first step toward improv-
501 ing the condition of the river was taken by deepening the Illinois and Michigan Canal, so as to cause a current from the lake to the Des Plaines River at Lockport. The next step was the building of the Fullerton avenue conduit in order to produce a circulation in the North Branch; and the last step was the erection of the canal pumping works to increase the flow in the river, which had become greatly polluted.

The influence of these works is confined to the main river and its north and south branches. But the south fork of the latter, receiving a large amount of sewage from Chicago and the town of Lake, and charged with the waste from the Union Stock Yards and packing houses, has no artificial means for a circulation of its water, and as a consequence is in a condition of great filthiness.

The accompanying diagram (a) has been prepared to show the present pollution of the Chicago River and its branches during the time when all of their water is discharged into the canal by the Bridgeport pumps. On the left are shown the main river and the north branch, one above the other, their combined waters forming the south branch, and reaching Bridgeport on the right, where they are lifted into the canal.

At the latter point the south fork is shown as joining it. The shaded portions indicate the amount of sewage entering and passing the respective points, and the blank portions the lake water diluting it. The degree of dilution is shown by the relative areas. It diminishes in the north branch from Fullerton avenue to the south branch, and becomes still less toward Bridgeport, and finally receives the foul waters of the south fork.

The depth and character of sewage deposits in the river and harbor, as might be expected, vary consider-

ably. They are not great in the track of the vessels, but increase toward the docks and quieter portions of the slips, where they reach a depth of from one to four feet. While the deposits in the channel are of a heavier kind, such as cinders, those in the docks are mostly a foul mass of decomposing organic matter. No form of life is found to exist above Clark street bridge as far north as Clybourn place and as far south as Ashland
502 avenue. The effect of this condition of the river is to endanger the purity of the water supply whenever the river, with its accumulated deposits, flows into the lake, which occurs when the rain water that finds its way into the river exceeds the amount pumped into the canal. If this excess is great, as in the spring and occasionally in the summer months, the contamination of the lake is considerable, and must constantly increase.

From the foregoing it is seen that the present method of disposal of the sewage from Chicago and its suburbs is partly by discharging it into Lake Michigan, but mainly, except during floods, by discharging it into the Des Plaines River.

Future population.

The first question which requires an answer, and upon which many of the subsequent inquiries depended, was the population which it is economical and advisable to consider at present, and the extent of territory upon which such a population will be located.

The growth of Chicago has been frequently quoted as phenomenal. Estimates made thereof for various purposes have turned out to be rather under than over the actual result.

It is taken for granted that Chicago and its suburban towns will have to dispose of their sewage so that the water supply for the entire community residing near the lake from the south line of Hyde Park to the north line of Evanston will be guarded against pollution by the sewage from any one of its separate communities. For this purpose the whole populated area within the above limits is considered as forming one city with a common interest.

The growth of this metropolis was obtained partly from the United States census and partly from the school census of Cook County, which gave a record up to the summer of 1886. In order to forecast the probable ratio of the future increase it was desirable to compare this

growth with that of other cities. By considering the ratio in increase elsewhere, and including the natural suburbs
503 of each city, a fair and instructive basis of comparison was obtained; and by realizing the respective natural advantages for growth in each of the communities the probable ratio for Chicago was determined with a satisfactory degree of exactness.

The accompanying diagram shows the results of this comparison. It represents by curves the population of the largest cities in the country since 1790, not as usually quoted from the census, giving the inhabitants on certain arbitrary areas fixed by law, but as virtually making up the population of the respective municipalities, by including adjacent towns and natural suburbs, the only method which enables the true growth of the great cities to be recognized. For instance, the New York center naturally includes Brooklyn, Jersey City, Hoboken, Newark and other suburbs, and Chicago the entire territory from Hyde Park to Evanston.

The diagram indicates that the character of growth of the different cities permits them to be divided into two distinct classes. Philadelphia, Boston, St. Louis and Cincinnati show very much the same character of increase, and represent by comparison the more conservative communities. New York and Chicago, on the other hand, while showing a remarkable resemblance to each other, form quite a contrast to the rest of the cities, and might be called the more progressive communities. The diagram finally indicates the time when the Chicago curve, which was the lowest one prior to 1864, intersected in turn those of St. Louis, Cincinnati, Boston, and there is a high degree of probablity of its intersecting the Philadelphia curve in or before 1891—*i. e.*, in four years from now—after which Chicago will be the second largest center of population in America.

As it is not practicable in so young a city as Chicago to forecast a definite line of growth, it is preferred to give the probable maximum and the probable minimum between which the true line will most likely be contained. The minimum line represents a growth resembling that of New York and the maximum line assumes the ratio of increase per decade to be consistent instead of gradually decreasing as in most other cities. The result indicates that the population of Chicago and suburbs will be 2,500,000 between the years 1905 and 1915, or about three times the present population is 18 to 28 years.

In providing public works for large communities it
504 must be borne in mind that it is economical to invest only such sums as will bring a return within a certain number of years, leaving expenditures for benefits that will be realized only at a later time to a later generation. This fact, together with the probable growth of Chicago, shows it to be economical and judicious at present to plan works sufficiently extensive to dispose of the sewage of not less than 2,500,000 inhabitants.

In addition to the population the area that will be occupied by it has to be determined. While this is a far more difficult task, owing to the many accidental causes influencing the distribution of the population, it is possible nevertheless to outline the area sufficiently close for the present purposes.

The future metropolis, with a population three times as great, will be distributed along the lake from South Chicago to Evanston, and will reach inland to the Blue Island Ridge on the south to the Des Plaines River in the center, and to the higher parts of Niles Township in the north. Outside of these general limits, a more or less dense population will extend for some distance along the lines of railroad.*

As inferred above, it is proper to consider at this time the wants of the population that will reside upon this entire territory.

Discharge of the Sewage into Lake Michigan.

To discharge the sewage from cities into comparatively large bodies of water is not only the usual, but often the best method for its disposal. Dilution and dispersion thoroughly expose it to the action of the oxygen contained in both the water and the superincumbent air; it is thereby gradually oxidized. Where the body of water is a large river with a strong current, the best conditions for such purification are found. Where it is a lake in which the circulation is slight and irregular, the efficacy of the method is less and depends for its success on the character of the currents and the relative amount of sewage to be discharged into it.

The hydrographic surveys of the lake made during
505 the past season were therefore partly for the purpose of

*Here occurs a diagram showing the "growth of several population centers in the United States," not here reproduced.

ascertaining, if possible, the laws governing the currents, so that we would know their effect in dispersing the sewage discharged into the lake. The trend of the shore currents was actually ascertained by daily recording the direction of spar buoys placed at the Chicago waterworks crib, at Michigan City and at St. Joseph. A large number of bottle floats were thrown into the lake at different points and different times for the same purpose. They were partly single surface floats and partly double, the lower one being placed at varying depths, according to the depth of the water. More than half of them have been picked up and returned, with place and date noted. The currents were also observed by means of large can buoys from an anchored tugboat at different points in the lake, extending from Hyde Park to Evanston, about six miles from the shore. Two general lake trips were undertaken, one to St. Joseph and back to Grosse Point, and another one parallel with the shore around the head of the lake.

When the observations are completed and compiled in detail, some valuable information will be available for the question of water supply. Light will be thrown on the movement of the water under different winds and the sudden changes of temperature of the water at the crib and on the turbidness of the same.

The following results have a bearing on the question of sewage disposal: Where not affected by local conditions, the currents practically go with the winds in water of moderate depth and quickly respond to any change. In deep water also the surface currents run with the wind, but at the bottom and even at mid-depth the direction is usually different. The prevailing current along the shore of Cook County during the past summer has been observed to be toward the north, but it is possible that this result may be different during the winter months. In the open lake wave action seems to be effective in preventing the permanent deposits down to a depth of about 60 feet; inside of the breakwater sewage deposits are found on the bottom.

The general deduction from these results is clear that, as no constant current exists which would carry the sewage away in one direction, it should be discharged into the lake at one end of the future city, while the water supply should be obtained as far away from it as prac-
506 ticable towards the other end, a conclusion which is being acted upon in the other large lake cities. The proper place from which to bring the water would be opposite

Grosse Point, and the sewage discharge should be east of Hyde Park. While it might be practicable to allow the sewage in its crude form to enter the lake under such conditions for many years, the necessity would arise later for clarifying it at least partially previous to its discharge. It could not be allowed to run into the river as at present, but the dry weather flow and a considerable amount of storm water would have to be intercepted and carried to the outfall through many miles of special conduits. This entire quantity would have to be raised by pumping in order to get sufficient head to empty into the lake, while the diluted sewage during storms, in excess of the capacity of the intercepting sewers, would be allowed to discharge directly into the river.

The water supply would have to be brought from Grosse Point in large conduits to the several pumping stations scattered over the city and its present suburbs. The circulation of the water in the Chicago River and branches would have to be maintained practically as it is at present, because the removal merely of the dry weather flow of sewage would not altogether prevent is pollution.

Disposal on land.

We shall not at this time enter into a general discussion of the principles underlying land purification of sewage, or make historical references showing the success or ill success of the method as practiced elsewhere. We will simply state that with good management under ordinarily favorable conditions a disposal on land proves satisfactory, so far as the purification of the sewage is concerned, and that with proper conditions in the way of good markets and a favorable soil and climate sewage farms can be operated on a large scale after the sewage is delivered upon the same without financial loss.

In speaking of a sewage farm of the magnitude required for the metropolitan area of Chicago, it is not understood as being land devoted primarily to the raising of crops, using the sewage only when and where it
507 would most promote the growth of vegetation. The primary object would be the purification of the sewage on an area of land as small as could serve the purpose. Technically speaking, the sewage disposal would be by means of intermittent filtration rather than irrigation. To carry out such a scheme for Chicago involves the following:

(1) The acquirement of sufficient land suitable for the purpose.

(2) A comprehensive system of intercepting and collecting sewers carrying the sewage to the farm.

(3) Pumping works of a capacity to handle all the dry weather flow of sewage and a certain proportion of storm water.

(4) A thorough underdrainage, leveling and preparing of beds for the filtration areas.

(5) A system of underground conduits and surface carriers for distributing the sewage over the ground and a system of open ditches for removing the purified water to the nearest water courses.

(6) Buildings, roads, and a complete farming outfit.

(7) An organization for properly distributing the sewage, for carrying on the farming operations, for conducting the business of disposing of the crops in the best market.

In making estimates for the size of intercepting sewers, conduits, pumps and area of land required, we have used as a basis a population of 2,500,000 people, with an average dry weather sewage discharge of 150 gallons, or 20 cubic feet, per head daily, and made provision for storm water equivalent to one-fifth of an inch in 24 hours over all portions of the district now drained or likely to be drained by a combined system of sewers, allowing surplus water to escape in the rivers and lakes.

The dry weather flow of sewage would therefore be 50,000,000 cubic feet per day, and the maximum flow of storm water 65,000,000 cubic feet per day, making a total maximum discharge of 115,000,000 cubic feet.

From an examination of rainfall tables we conclude that the annual amount of storm water that would be carried off by such an intercepting system would range from 9 to 12 inches, an average of which in round numbers may be taken at 40,000 cubic feet per acre per annum over the area drained by a combined system of sewers. It is practicable, however, to exclude the storm water from the sewers over a large portion of the future
508 city by adopting the separate system of sewerage. The area north of the town of Jefferson and of the middle of Lake View may be treated to advantage in this way,

and also a large portion of Hyde Park, Lake Calumet and other adjacent towns.

Assuming that the area which does not allow the storm water to be entirely excluded is 140 square miles, the average daily amount becomes 10,000,000 cubic feet, which gives, when added to the sewage, 60,000,000 cubic feet, or 24 cubic feet per head of population per day to be provided for on the farm.

As the amount of land required to purify sewage can only be determined by experience, and as this has been very limited in our own country, we are forced to rely mainly upon that of Europe. Without going into details at present, we will simply state that a fair consensus of this experience justifies us in the conclusion that from 10,000 to 15,000 acres of land would be required to dispose of the sewage from the entire metropolitan area.

The only available territory for sewage filtration in the neighborhood of Chicago consists of two sandy ridges in the Town of Thornton, extending across the state line into Indiana, and in a sandy ridge crossing the Town of Niles. The soil is quite favorable, but the character of the surface is such that the necessary preparation to make it suitable for filtration beds would be comparatively expensive. An enormous cost is, however, represented by the fact that the sewage would have to be collected by large intercepting sewers, lifted altogether some 90 feet, and carried about 20 miles before reaching the farms. We therefore consider such a project entirely impracticable.

The land treatment can only be seriously thought of in connection with the sewage disposal from the smaller areas mentioned above and comprising the extreme northern and southern parts of the future metropolis. The drainage of parts of Evanston, Lake View and Niles might be taken to the sandy ground in the latter town, and that of the Calumet region to the sandy ridges in Thornton, should this method be found most advantageous when compared with others.

The preliminary investigation made for this purpose consisted in an examination of the grounds in the projection of a farm, and in an estimate of the cost of preparing the same and delivering the sewage to it by intercepting sewers and conduits.

Discharge of the Sewage into the Des Plaines River.

509 [A third solution of the drainage problem is rendered practicable by the fact that the divide between Lake Michigan and the Mississippi Valley lies about 10 miles west of Chicago, with so slight an elevation that it is not a difficult matter to carry the sewage from the city westward into the Des Plaines River, and thence into the Mississippi River.] The method of disposal, as previously explained, is in fact mainly the present one, most of the sewage now being carried across the divide by the Illinois and Michigan Canal.

There are two low depressions between the future metropolis and the Des Plaines River—the Mud Lake Valley, with the present canal, and the Sag Valley west of Lake Calumet. Neither is more than 10 feet above the lake, nor do they present any engineering difficulties for canal construction. It is therefore quite feasible to carry all the drainage from the territory ultimately to be occupied by the metropolis, extending from Lake Calumet to Evanston, into the Mississippi Valley through these depressions, avoiding thereby all possible lake pollution and permitting the supply of water to be drawn from any number of convenient points in front of the city.

The possibility of this solution was recognized as early as 1856 by Mr. E. S. Chesbrough, and the first step towards its adoption was taken, as already mentioned, by turning the sewage into the Illinois and Michigan Canal. Not until quite recently, however, has it become practicable to consider the construction of a special waterway for sewage removal, because when the population was smaller the expense of the undertaking was too great.

The sanitary requirements demand a flow of water large enough to dilute sewage sufficiently to make it inoffensive along the river at all times. Beyond this, any increase in the size of the channel to provide for the storm water which naturally enters it should be kept at a minimum. A glance at the map and an examination of the ground show the possibility of diverting the greater part of the storm water from the metropolitan district without serious difficulty. Both branches of the Calumet River can be diverted west of the Indiana state line into Wolf Lake, and thence into Lake Michigan. The Des
510 Plaines River can have its flood water diverted into the North Branch near the north line of the Town of Jefferson, and the combined waters can be led from Bowmanville directly into the lake. Salt Creek, a branch of the

Des Plaines River, can readily be turned southwardly near Western Springs, through a water course known as Flag Creek, at one time evidently its old bed, discharging into the Des Plaines opposite Sag, and thus reducing the necessary storm water capacity in the new channel between Sag and Summit.

In order to determine the probable quantity of flood water which can thus be excluded, it was necessary to ascertain the maximum flood discharges from all the watersheds in question. This requirement called for a gauging of Des Plaines, North Branch and Calumet Rivers; a gauging of the rainfall, which is a measure of the stream flow; a survey of the watersheds and an examination of the river channels. It was also necessary to make a reconnoissance of all possible lines for diverting the Des Plaines, the North Branch, the Calumet River and Salt Creek, and a survey of those which were most important.

The results indicate that each one of these diversions is both practical and economical. By adopting the "separate system" of sewerage for the territory lying north of the proposed Bowmanville channel, the surface drainage from this territory can be safely turned into the lake.

A second branch of the investigation extends to the elements governing the proper size of the waterway from which a large proportion of the storm water has been excluded. The area still draining into it will consist largely of paved streets and roofs, allowing of no absorption and shedding the water rapidly. It requires a careful consideration to determine the maximum quantity of water that may enter the proposed channel, and for which an ample allowance must be made to prevent a back flow of the polluted water to the lake.

The proper degree of sewage pollution in the new channel demanded a careful investigation. When sewage is mingled with a sufficiently large quantity of water it not only becomes inoffensive, but readily finds the oxygen which gradually purifies it. When the surface is covered with ice a greater dilution is necessary for this purpose than at other times when there is a constant
511 replenishment of oxygen from the air. The proposed waterway should, of course, provide immunity from offense at all times.

The information upon which definitely to decide this question will be given in the final report, as the data have not yet been all collected, owing to the necessity of

making actual tests of the oxidation of the canal water under the ice, which is being done for the use of the commission by Dr. J. H. Rauch, secretary of the State Board of Health. The summer conditions are presented in his late report on the water supply and sewage disposal of Chicago. The result of these analyses will be compared with those of other streams that are also polluted with sewage in order to show the rate of oxidation with varying degrees of dilution and aeration.

For the purpose of estimating the cost of the water channel we have assumed 3,600 square feet for the cross section and a velocity of the water 3 feet per second, or 2 miles per hour. This gives a discharge of 600,000 cubic feet of water per minute, or 24,000 cubic feet for each 100,000 persons, which we believe equal to the maximum requirements of a population of 2,500,000 people.

A third branch of the inquiry covers the selection of routes for the proposed canals.

Between Chicago and Summit three lines are practicable—one following the west fork and Ogden ditch, and another extending from the southwestern end of the south fork in a westerly direction to the Ogden ditch, and thence to Summit, and a third being an enlargement of the present canal. We are of the opinion that eventually both the first and second of these lines should be adopted, but that the second one should be built first in order to secure circulation in the south fork. From Summit westward the bed of the river and the present canal were the only lines to be considered. The best location has not yet been finally determined.

For the drainage of the Calumet region a simple inspection shows that a canal should start from the river at the southern point of Blue Island, and extend almost directly westward to the Des Plaines Valley at Sag.

A fourth branch of the inquiry relates to the study of such data as have reference to securing a proper circulation for the waterways within the city.

To throw light upon this point the variations of the lake level have been recorded since last spring by means
512 of an automatic gauge indicating an almost continual fluctuation, averaging several inches, and recurring at periods of about 20 minutes. During a low pressure of the atmosphere the amplitude of these oscillations increases, and not unfrequently reaches several feet. The accompanying diagram shows the level of the lake on

August 16, 1886, at a time when an area of low barometer passed over it. From 6:40 a. m. to 6:55 a. m.—that is, in 15 minutes—the water fell 2 feet 10 inches.

A rising level causes an inflow to the river and drives the water of the latter into the slips, where it deposits a portion of its suspended sewage matter and becomes foul. A falling level reverses the flow, and the slips empty their foul water into the river and lake. During heavy fluctuations of the latter, such as the one referred to above, it has been traced more than a mile in the direction of the crib.

As the proposed canal from Bowmanville to the lake will lower the water of the North Branch at this point to the lake level, provision must be made for its circulation. The size of the Fullerton avenue conduit is not sufficient to furnish the water required for a current in both directions, nor would such an arrangement be satisfactory or economical. It will be necessary to establish a flow towards the South Branch from the lake opposite Bowmanville in order to prevent a future lake pollution by the proposed channel. This can be accomplished by placing a lock in the North Branch at any point that may be found most desirable and raising the water at the same time about one foot. If such a lock is placed at Fullerton avenue the present pumping works, with slight modifications, can be utilized.

Finally, it must be mentioned that circulation can be secured in the proposed waterways of the Calumet region, into which the sewage is discharged, by a gravity flow from Lake Michigan into the Des Plaines Valley through Lake Calumet and the Sag. The detailed features of this project have not yet been wholly matured, the estimates of cost being based on a channel having a capacity of 1,000 cubic feet per second.

Comparison of projects.

513 In the foregoing we have outlined the main features of the only three feasible methods of disposing of the metropolitan sewage, and have given the results of the investigation reached to date. A general conclusion as to the preferable method may be given at present, and also an approximate estimate of cost. But we are not able as yet to give either conclusions or detailed statements of the probable expense regarding all parts of the

proposed work, and must defer them until the final report.

In comparing the projects we will first mention their probable cost and then their relative advantages.

The discharge of the sewage into the lake from a population of 2,500,000 in the manner described above, including the extra expense, otherwise not necessary, of taking the water supply of Grosse Point, would cost at least $37,000,000, with an annual expense for interest and operation of at least $2,400,000. It would require an immediate investment of about $20,000,000.

To dispose of the entire metropolitan sewage by filtration on land would require an investment of about $58,000,000, with an annual expense of over $3,000,000 for interest, pumping, and maintenance, after deducting the profit from the sale of crops. It would be necessary to invest at once about $34,000,000. Land disposal for the sewage, from the Calumet region alone, with a future population of 300,000, would require an investment of about $4,000,000 and an annual expense of at least $250,000.

Finally, the cost of the Des Plaines project is approximately estimated as follows:

1. A channel from the South Fork to Joliet of the capacity heretofore given will cost between $17,000,000 and $21,000,000.

2. A diversion of the flood waters of the Des Plaines, the North Branch, and Salt Creek will cost between $2,500,000 and $2,800,000.

3. Pumping works and locks for the North Branch will cost about $150,000.

Omitted; printed in House Ex. Doc. No. 264, 51st Cong., 1st sess.

514 4. A separate system of sewers to collect the sewage now discharged directly into the lake and to carry it into the river will cost about $600,000.

5. A channel from Lake Calumet to Sag will cost between $2,500,000 and $3,000,000.

6. A diversion of the flood waters of the Calumet River will cost between $350,000 and $400,000.

The total cost of the Des Plaines drainage project would therefore be, for the main district, between $20,250,000 and $24,550,000; for theCalumet district, between $2,850,000 and $3,400,000. The annual cost, including interest, etc., is estimated at about $1,300,000 per annum.

The pollution of the lake can be decreased and the present condition of the Chicago River, and particularly of the South Fork, can be improved by the immediate construction of the following works, which, with the exception of the pumping works at the South Fork discharging into the Illinois and Michigan Canal, are all a part of the final plan.

1. Channels diverting the flood waters of the Des Plaines, North Branch, and Salt Creek, as described above.

2. A modification of the Fullerton avenue pumping station and the construction of locks for the purpose of getting circulation in the North Branch.

3. A separate system of sewers to collect the sewage now flowing into the lake from the south division and to discharge it into the South Fork.

4. A waterway extending from the western end of the South Fork to the Illinois and Michigan Canal, with a new pumping station to promote circulation.

5. By raising the banks of the canal and by removing deposits this capacity can be increased 40 per cent. at a small cost, and thus provide for a greater flow of water in the same.

The cost of the works comprised under these five items is estimated to be between $5,000,000 and $5,500,000. They could be finished in three years, and would greatly lessen the liability of polluting the water supply, while the sewage would be disposed of in the best practicable maner until the final completion of the Des Plaines project.

It therefore appears that this project is decidedly the least expensive one for the present as well as for the future.

Besides the economical advantages of the Des Plaines scheme, its superiority is still further emphasized by advantages of another kind. The proposed canal will, from
515 its necessary dimensions and its regular discharge, produce a magnificent waterway between Chicago and the

Mississippi River, suitable for navigation of boats having as much as 2,000 tons burden. It will establish an available water power between Lockport and Marseilles fully twice as large as that of the Mississippi River at Minneapolis, which will be of great commercial value to the state. The Calumet region will be much enhanced in value by having a direct navigable channel to the Des Plaines River and by a lowering of the flood heights of Calumet Lake and River. Within the city the water of the Chicago River and its South Branch will get a much better circulation if it flows by gravity than if it has to be pumped, the necessity for which would remain even if the sewage should be discharged through intercepting sewers, either into the lake or upon land. Upon either of the latter conditions an occasional overflow from the sewers into the river during heavy rains would be more objectionable than a constant discharge of sewage into a more rapidly flowing stream. Flood waters entering the lake by way of the Chicago River would carry into it much filthy matter, either suspended or deposited, notwithstanding the existence of intercepting sewers, but the proposed diversion of such waters before reaching the populated districts will for all time obviate this undesirable occurrence. Lowering the level of the North Branch at Bowmanville by its diversion to the lake will be equivalent to raising the low prairie extending towards Evanston and Niles and greatly benefit parts of these towns.

The water supply.

In reaching the conclusion that the sewage of the city should be discharged into the Mississippi Valley the question of water supply is materially simplified, because the lake will then at all times furnish good water wherever intakes are desired for an extension of the works."

The Illinois General Assembly in 1887 did not pass the Sanitary District Act known as the Hurd Bill but authorized a joint committee to sit *ad interim* and report to the next session of General Assembly in 1889. See testimony of Cooley (Rec. Vol. III, p. 1727. This narrative p. 280.)

In a report by Major W. H. H. Benyaurd, under the Rivers and Harbors Act of August 2, 1882, (Rec. Vol. IV, p. 2251), he said:

"EXTRACT FROM THE CHIEF OF ENGINEER'S REPORT 1884, APPENDIX HH, P. 1957, ENTITLED 'PRELIMINARY EXAMINATION OF ILLINOIS AND DES PLAINES RIVERS BETWEEN LA SALLE AND JOLIET, ILLINOIS.'

UNITED STATES ENGINEER OFFICE,

CHICAGO, ILL., September 2, 1882.

General: I have the honor to present the following report in regard to the proposed survey of the Illinois and Des Plaines Rivers from Joilet to La Salle, Ill., as provided for in the river and harbor act of August 2, and assigned to my charge by letter of August 11.

Several surveys have been made of the route by the State and by the General Government, and I have not deemed it necessary therefore to make a personal examination of the stretch of river in question, in order to report upon the necessity of an instrumental survey. I have examined the maps and consulted the reports and other sources of information, and deem it necessary to make survey, estimates for which are presented herewith.

The necessity of the improvement derives its importance from several considerations. The State has improved the river for ship navigation from La Salle to Copperas Creek, and the Government is now engaged in
2252 continuing the improvement thence to the mouth. I am directed to report upon the cost of enlarging the Illinois and Michigan Canal, which extends from Lake Michigan to La Salle. This work, if ever carried on, will give through navigation for large vessels from the lake to the Mississippi. The canal runs in close proximity to the river the entire distance from Joilet to La Salle, and in making up the estimates for the enlargement of the canal it will be necessary to discuss whether or not it will be more economical to enlarge the canal between those two points, or to improve the river and abandon the other.

Very respectfully, your obedient servant,

W. H. H. BENYAURD.
Major of Engineers.

Brig. Gen. H. G. Wright,
Chief of Engineers, U. S. A."

March 5, 1884, Major Benyaurd made a further report pursuant to said Act of August 2, 1882, in which it was stated:

> "That with the improvement of the River now in question carried on, navigation will be brought to within thirty-three miles of the Lake, and this stretch can be opened by improving the DesPlaines higher up and by enlarging the present Illinois and Michigan Canal."

Section 4 of the Rivers and Harbors Act of August 5, 1886, is as follows:

> "Sec. 4. The Secretary of War shall prescribe such rules and regulations as may be necessary to secure a judicious and economical expenditure of the money herein appropriated, and shall cause to be made and submitted to Congress annual reports, together with maps and plans, including the report of the Mississippi River Commission, on or before December first, giving detailed statements of the work done, contracts made, the expenditures thereunder or otherwise, and balances of money on hand up to November first, and the effect of such work, together with such recommendations as he may deem proper. He shall at the same time report to Congress all cases in which piers, breakwaters, locks and dams, or other structures or works built or made by the United States in aid of commerce or navigation are used, occupied, or injured by a corporation or an individual, and the extent and mode of such use, occupation or injury. He shall report, at the same time, whether any bridges, causeways or structures now erected or in process of erection do or will interfere with free and safe navigation."

In a report by Major Handbury, 1887, under the Rivers and Harbors Act of August 5, 1886, (Rec. Vol. IV, p. 2257) he said:

> "Extract from a Report of Major Handbury, Chief of Engineer Reports 1887, Appendix II, p. 2119, Entitled 'Improvement of Illinois River, Illinois.'
>
> The project now in the course of execution for the reach of the Illinois River lying between the state lock at Copperats Creek and the mouth, a distance of 135 miles, contemplates the construction of two locks and dams and the dredging of a channelway where neces-

sary, so as to insure a continuous depth throughout of not less than 7 feet at low water.

The sites selected for the locks and dams are one at Kampsville, about 30 miles above the mouth of the river: the other at LaGrange, 45 miles above Kampsville. These locks are 350 feet long and 75 feet wide, with 7 feet over miter-sills at low water.

The ultimate object of this improvement is to provide a channelway from the lower end of Lake Michigan to the Mississippi River of sufficient capacity to accommodate large sized Mississippi River boats, so that the products of the country may be carried from the Lake to the Gulf without breaking bulk; also to enable vessels of war of considerable capacity to pass freely from the Gulf of Mexico into the defenseless waters of our northern lakes, should the exigencies of our foreign relations ever require this to be done.

Page 2121.

When this work is completed it will then be practicable for the large steamers belonging to the Upper and Lower Mississippi, the Ohio, and Missouri Rivers to come with their unbroken cargoes to within 100 miles of Lake Mich-
2258 igan. All this can be brought about by an expenditure on the part of the government of less than $600,000.

The Illinois River, from the western terminus of the Illinois and Michigan Canal at LaSalle to Copperas Creek, about 80 miles below, has been improved by the State of Illinois by means of two locks and dams similar to those in process of construction by the United States on the river below. From LaSalle to Joliet the Illinois and Des Plaines Rivers have been carefully surveyed, and plans and estimates of cost for their improvement to the same navigable capacity as the river below have been made and submitted to Congress. The report on this project submitted by Maj. W. H. H. Benyuard, Corps of Engineers, U. S. Army, may be found in the Chief of Engineer's Report for 1884, page 1958. The estimated cost of improving this reach of the river is $3,433,562. The distance is 64 miles and the fall 100 feet. Congress has now before it the engineering data showing the feasibility and cost of a water communication between the Mississippi River and a point 30 miles distant from navigable water leading into Lake Michigan sufficiently commodious for the commercial and military exigencies of

the country, and from this point to the lake perfectly practical routes over which the line can be constructed are known to exist. It only remains for Congress to provide the means for making the necessary surveys and estimates of cost for continuing this work from Joliet to Lake Michigan, when it will have the engineering features of the whole subject before it in a shape necessary for intelligent legislation. I estimate that about $10,000 will be sufficient to defray the expenses of the necessary surveys and examinations and preparation of the plans and estimates of costs of the work.

The United States and the State of Illinois have long been committed to the project of opening a water communication between the Mississippi River and the north-
2258 ern lakes of capacity sufficient for the wants of commerce and for the exigencies of our national defense, should these ever arise. The amount expended by the United States to the end of the present fiscal year in carrying out this project is $680,633.42, exclusive of $62,359.80 expended on the foundation of the Copperas Creek Lock, which was afterwards turned over to the State. The cost of the locks and dams built by the State of Illinois at Copperas Creek and Henry was $747,747.

The distance by this route from the Gulf of Mexico to the southern end of Lake Michigan is about 1,620 miles. When the projected improvement of the Illinois
2259 River below Copperas Creek, on which we are now working, has been finished, more than 1,520 miles of this distance will be available for the water transportation of commerce in bulk between these points. Pushing this improvement through to the lake, the connecting line will be formed which will join the northern lakes with the vast net-work of navigable rivers whose waters flow into the Gulf of Mexico on a scale to a certain degree commensurate with the importance of the commerce that will be affected by it. The mere fact that such a route is available will serve as a wholesome regulator to the rates that would be exacted by other methods of transportation were this one not in existence. Besides the immense commercial advantages that may be expected from the completion of the project, there are military and naval exigencies that might easily arise where it would figure as a prominent factor in the problem of our national defenses. From whatever point we look at the subject there is nothing local or sectional in it. It is true that all the work to be done happens to be in

the State of Illinois. The benefits to be derived belong to the nation at large. It is fortunate, too, that at this time the subject is unencumbered by any phase of a political character. The problem of connecting Lake Michigan with the Mississippi River by a commodious waterway, that could be used for commercial, military and naval purposes, has received attention from our most thoughtful statesmen from the day of Albert Gallatin to the present."

On May 28, 1889, the legislature of the State of Illinois passed a resolution stating the deep waterway policy of the state asking the cooperation of the Federal Government for the construction of the Sanitary District Channel. The Resolution is as follows (Rec. Vol. IV. pp. 2329-30):

"Joint Resolution

Whereas the present addition to the low-water volume of the Illinois River through the summit level of the Illinois and Michigan Canal from Lake Michigan more than doubles the volume of water used in the estimate of 1868 for the channel below Peru, and adds 50 per cent to the volume used in the estimate of 1880 for the channel below Copperas Creek and said contribution from Lake Michigan will be increased in the immediate future, thus enabling the depth now projected for navigation below Peru to be obtained by channel improvement at moderate cost, and with decided advantage to material interests and to healthfulness along the valley.

Whereas it is contemplated to increase the volume from Lake Michigan to 300,000 cubic feet per minute within a few years, and ultimately to add 600,000 cubic feet or more, thus enabling a large depth for navigation to be obtained by an improved channel, and that said channel will be self-sustaining and self-improving and will discharge flood waters more readily, thus benefiting the bordering lands and increasing the healthfulness of the valleys.

Whereas works now projected by the City of Chicago will form part of a waterway of large proportions from Lake Michigan via the Des Plaines and Illinois rivers to the Mississippi River, of which the dams and locks upon the alluvial section of the Illinois River, can form no part, and which, if allowed to remain, will increase,

overflow and be detrimental to the welfare of the Illinois Valley and the interests of the State: Therefore be it Resolved,

By the Senate of the House of Representatives concurring herein (1) That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practicable depth and usefulness for navigation from Lake Michigan via the Des Plaines and Illinois rivers to the Mississippi River and to encourage the construction of feeders thereto of like proportions and usefulness. (2) That the United States is hereby requested to stop work upon the locks and dams at La Grange and at Kampsville, and to apply all funds available and future appropriations to the improvement of the channel from La Salle to the mouth with a view to such a depth as will be of present utility and in such manner as to develop progressively all the depth practicable by the aid of a large water supply from Lake Michigan at Chicago. (3) That the United States is requested to aid in the construction of a channel not less than 160 feet wide and 22 feet deep with such a grade as to give
2230 a velocity of 3 miles per hour from Lake Michigan at Chicago to Lake Joliet, a pool of the Des Plaines river, immediately below Joliet, and to project a channel of similar capacity and not less than 14 feet deep from Lake Joliet to La Salle all to be designed in such manner as to permit future development to a greater capacity.

On May 29, 1889, the Legislature of the State of Illinois passed an act providing for the creation of the Sanitary District of Chicago, which act became in force, July 1, 1889. (Rec. Vol. VIII, p. 92.) Said Act provides for the size of channel to be constructed in Section 23. (Rec. Vol. VIII. pp. 103-104.) Other sections of the Act are set forth in this narrative statement page 69.

"23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois river such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet, and a current not exceeding three miles per hour, and if any portion of any

such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan, of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water. If the population of the district draining into such channel shall at any time exceed 1,500,000 such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines or Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act, may correct, modify and remove obstructions in the Des Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage, along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel. And the canal commissioners, if they shall find at any time that an additional

supply of water has been added to either of said rivers, by any drainage district or districts, to maintain a depth of not less than six feet from any dam owned by the State, to and into the first lock of the Illinois and Michigan Canal at La Salle, without the aid of any such dam, at low water, then it shall be the duty of said canal commissioners to cause such dam or dams to be removed."

In the report of Captain Marshall, United States Engineer at Chicago of February 28, 1890, Captain Marshall (Rec. Vol. IV, pp. 2156-58) said: Chief of Engineers Reports 1890 Appendix J. J. 2419.

Survey of Waterway from Lake Michigan to the Illinois River at La Salle, Illinois.

"United States Engineer Office.

Chicago, Ill., February 28, 1890.

General: I have the honor to submit the following report upon a survey of a waterway from Lake Michigan to the Illinois River at La Salle, Ill., forming part of a through route of transportation from Lake Michigan to the Mississippi River, required by Act of Congress of August 11, 1888.

2157 The Act in question is entitled 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' and the items directing the survey, plans and estimates, and relating thereto, are as follows:

'Improving Illinois River, Illinois: Continuing improvement Two Hundred Thousand Dollars. And for the purpose of securing a continuous navigable waterway between Lake Michigan and the Mississippi River, having capacity and facilities adequate for the passage of the largest Mississippi River steamboats, and of naval vessels suitable for defense in time of war, the Secretary of War is authorized and directed to cause to be made the proper surveys, plans, and estimates for a channel improvement and locks and dams in the beds of the Illinois and Des Plaines Rivers from La Salle to Lockport, so as to provide a navigable waterway, not less than one hundred and sixty feet wide, and not less than fourteen feet deep, and to have surveyed and located a channel

from Lockport to Lake Michigan, at or near the City of Chicago, such channel to be suitable for the purposes aforesaid; the necessary expenses of such surveys, estimates, plans and location to be paid for out of the sum herein appropriated for the improvement of the Illinois River.'

In compliance with the orders of the Chief of Engineers a project for this survey was submitted September 21, 1888, which was approved September 25, 1888. The expenses of the survey to be paid from an allotment of $25,000 from the appropriation for the improvement of the Illinois River.

A letter of instructions was received from the chief of engineers, dated August 27, 1888, a copy of which is herewith, directing that whatever line might be found most advantageous and economical to the United States, and best suited to subserve the ends in view, that plans and estimates in any event should be submitted for a route terminating within the (then) limits of the City of Chicago sufficiently distinct and in detail to enable the Chief of Engineers to form a definite and conclusive
2158 opinion as to its merits regarded from the standpoint of the commercial and sanitary interests of Chicago.

The most practicable routes across the Chicago Divide, and which have been long known and recognized, are two, each of which admits choice of location, the valleys being quite wide.

(1) By way of the Chicago River and its South Branch and the present location of the Illinois and Michigan Canal, or Mud Lake and the Ogden Ditch, to the Des Plaines, near Summit, about 12 miles from the City Hall of Chicago and about 8 miles from Bridgeport; thence via the Des Plaines River Valley, uniting at Sag Bridge with route."

* * * *

Referring to the drainage and water supply commission report of 1887 and the Sanitary District Act of 1889, the United States Engineer reports to the Chief Engineer as follows: (Rec. Vol. IV, 2161, 2162, 2167.) (Chief of Engineers Report 1890 Appendix J. J. 2436.)

2161 "Page 2436.

Attached to this report will be found the full preliminary report of the special commission or board of experts employed by the City of Chicago to examine into the question of drainage and water supply, made in 1887; also the laws and joint resolutions of the Legislature of the State of Illinois relating to the same matter, and authorizing the establishment of 'Sanitary Districts, etc.,' which will give a clear explanation of the requirements of the case and the proposed remedies.

Without going into the subject in detail, which is better treated in the report mentioned than it could be by me, it is sufficient to state that after examination by capable experts the conclusion has been arrived at that it is necessary, for sanitary reasons, to construct a channel or channels from the lake to the Des Plaines valley, beyond the Chicago Divide, capable of carrying to the Illinois River from 300,000 to 600,000 cubic feet of water per minute, to carry off and dilute to inoffensiveness the sewage of
2162 this great city, to prevent contamination of its water-supply *necessarily taken from Lake Michigan;* and that the necessary legislation to enable the city to undertake the work has been obtained from the State Legislature.

2167 Commercial Advantages.

This route has invited attention as a practicable locus for a waterway between the Great Lakes and Mississippi River for many years, and its advantages have been so often reported to Congress that anything herein said would be more repetition. It is sufficient to say that the minimum channel herein estimated upon will open a channel of commerce with a maximum annual capacity of 30,000,000 tons (foot note: Or 7,500,000 tons easily attainable capacity in practice.—W. L. M.) between the Great Lakes, with its terminus at their greatest port, and a system of navigable rivers penetrating one-half of the states and territories of the Union, with a total navigable length equal to more than half the circumference of the globe."

On April 21, 1891, the Sanitary District of Chicago passed a resolution for improving the Chicago River, which resolution is as follows (Rec. Vol. IV, pp. 2274, 2275):

"Resolution of April 21, 1891, of the Board of Trustees of the Sanitary District of Chicago.

Resolved, That this Board hereby ordains that The Sanitary District of Chicago do forthwith enter upon, use, widen, deepen and improve the Chicago River from its mouth at Lake Michigan to the South Branch thereof, and also the South Branch thereof, together with the South and West Forks thereof so as to make the same a proper and sufficient supply channel for the main channel heretofore surveyed from the Chicago River to Joliet; and further, that the Acting Chief Engineer be, and he is hereby, directed immediately to investigate and report upon the capacity of said River and its said South Branch and Forks for that purpose, and also as to any changes that should be made therein, and that a copy of this resolution, certified by the clerk, be forthwith transmitted to the Mayor and Common Council of the City of Chicago, and the Secretary of War of the United States."

In 1892 the United States Engineer at Chicago, Captain Marshall in a report to the Chief of Engineers, United States Army, reported the progress of the work of the Sanitary District as follows, Chief of Engineers Report 1892, Appendix J. J., page 2255 (Rec. Vol. IV, pp. 2180-2182):

"Page 2258.

The completion of the La Grange Lock and Dam has been followed by a material increase in the tonnage passing La Grange. The completion of the Kampsville Lock
2181 and the dredging the channel below it by extending the period of navigation there will have a more marked effect still in increasing the size and tonnage of vessels navigating the Illinois River and the value of this stream as a means of transportation.

Doubtless the slow improvement of this river has resulted from a difference of opinion as to the method of improvement that should be applied: On the one hand, the necessities of the city of Chicago for better drain-

age has demanded a large discharge into the Illinois River for sanitary purposes, which discharge would make an open river improvement practicable below La-Salle; on the other hand is the fact that the most economical and effective system, as far as navigation is concerned, is that by slackwater, modified, perhaps, by movable dams in the alluvial valley of the Illinois, Lake Michigan being the summit level, the channels being comparatively shallow but of greater width than proposed for sanitary purposes. Additional friction and consequent injury to both the scheme for a navigable channel and to the local drainage measure, delaying both, has been due to the demand by advocates of the latter that the United States shall construct the navigable channel of the dimensions necessary for the drainage scheme, without regard to the most economical channel and speedy method of meeting the absolute requirements of commerce by water over the connecting link between 14,000 miles of interior navigation existing upon the Mississippi River and its tributaries, and the Great Lakes.

These dissensions are now apparently quieted, and without friction the question of the extension of the navigation existing on the Western rivers to the Great Lakes, the best dimensions and location of channel from Joliet to La Salle, and the advisability and conditions of joint use by the United States for navigation and the city of Chicago for drainage of the channel that must be cut for both purposes across the rock in place, from near Willow Springs to near Lockport, can be now examined.

Upon this subject the reports of the Chief of Engineers for 1889, page 2121, *et seq.;* for 1890, page 2419, *et seq.;* and 1891, page 2611, *et seq.,* are referred to.

The authorities of the sanitary district of Chicago have progressed so far with their work as to have definitely located for the third time a part of the drainage channel, and have taken an additional step in advance by soliciting and receiving proposals for the construction of their channel for drainage across the rock between
2182 Willow Springs and Lockport. The prices secured are very favorable; the contract has not yet been awarded, but the proposals are under advisement by the trustees."

On August 9, 1893, Captain Marshall, United States Engineer at Chicago made a report to the Chief of Engineers which was by him transmitted to Congress with the annual re-

port of the Chief of Engineer, informing the United States that the work of constructing the Sanitary District Channel had begun. Captain Marshall said (Rec. Vol. IV, 2366, 2367, 2371), Chief of Engineers Reports, 1893, Part 4, Appendix L.L. p. 2794:

"With reference to the feeling of disgust entertained by the populace towards this stream, it must be said that from the earliest settlement of Chicago the most obvious disposal of their sewage and refuse, *i. e.*, into the lake and river, has been followed. As the city grew, the old sewers were enlarged and additional ones built. The Illinois and Michigan Canal was constructed, and the contents of the river loaded with sewage was to a then sufficient degree pumped into it; later, this proved insufficient, and the canal was cut deeper to allow a flow by gravity towards the Mississippi River; this also proved in time inadequate, and it was required by the Illinois Legislature that sixty thousand cubic feet of water per minute should be pumped into the Illinois and Michigan Canal from the Chicago River to purify that stream. This requirement has never been attained. As far as ascertained, the discharge has never for any length of time for the past four years exceeded forty-five thousand
2367 cubic feet per minute, and it is not believed to have averaged much, if any, above one-half the legal requirements, or thirty thousand cubic feet per minute. To purify the North Branch, pumping works and a tunnel from Lake Michigan to the North Branch at Fullerton avenue have been for years in use. Lake water is pumped through this tunnel and creates a feeble current towards the main river. This supply forms part of the thirty thousand to forty-five thousand cubic feet per minute pumped into the Illinois and Michigan Canal at Bridgeport.

The insufficient discharge of the pumps into the canal results, in rainless weather in a very feeble current from the lake towards the pumps at Bridgeport, and in an indescribable state of putridity and offensiveness in Chicago River, due to domestic sewage and a discharge from manufacturing establishments through the sewers into the river. At ordinary rains, upon freshets in the Desplaines or Chicago rivers draining areas, great volumes of putrescent matter are disgorged into the lake through the mouth of Chicago river threatening the water supply of the city, which in the main is taken through tunnels under the bed of the lake from two inlet cribs, situate, one north of and the other south of, and a few miles distant from the mouth of the river.

To remedy the, at times, insupportable and disgusting condition of the river and its branches; to purify the river and to preserve the city water, relief is now sought under state laws by constructing a drainage canal from the south branch of Chicago river to the Desplaines river above Joliet, capable of discharging into the Illinois River Valley from three hundred thousand to six hundred thousand cubic feet of water per minute.

It is a remarkable fact that this city, while seemingly unable or unwilling to provide funds for purifying Chicago river by pumping sixty thousand cubic feet per minute is ready to embark in, and has commenced the execution of a canal for discharging ten times that amount by gravity at a comparatively enormous expense.

This channel has been located from the south branch of the Chicago River to Lockport, and is under construction, but no provision has yet been made for channels of supply from Lake Michigan. Whatever the outcome or plans of the local officials having this work in charge may be, it can be said that the Chicago River and its branches cannot in their present condition, supply materially more
2368 than from one-third to one-half of the minimum requirements of the law, without producing currents that will be prohibitory to navigation at some of the bridges and obstructions now existing.

It is certainly evident, granting the proposition that effective channels for the purpose will be constructed, that if this method of solving the drainage problem is to be carried to conclusion, there must be a complete remodeling of Chicago River throughout both its branches, and there must be also artificial channels of large capacity to furnish even approximately effective outfalls to the sewerage systems of a great city founded on low lands extending some twenty-two miles long, and for miles back from the lake, as well as other large feeders connecting the lake with such channels.

Without criticizing in any way the local measures taken for local relief, it may be said that the state laws, if effectively executed for the purposes specified, seemingly require changes in the capacity of Chicago River and its branches that may increase, may diminish, or may even entirely destroy their value for commercial purposes. In any case under existing laws, no alteration in the capacity of Chicago River can be made without the consent of the Secretary of War, or without full examination by agencies established by Congress, and the

execution of the state laws are therefore limited by superior authority.

As before said, the navigable channel of Chicago River is now maintained by the City of Chicago by dredging out the solid matter cast into it through sewers, and dumped into it, especially in winter, by its street cleaning department. The city also maintains bridge tenders, harbor master, and vessel dispatchers, patrols the stream with fire boats; pumps inefficiently the sewage from the river into the Illinois and Michigan Canal; constructs and maintains all bridges except such as are necessary for corporate public carriers.

Riparian owners have constructed the docks and wharves, of which there are none for public use, and dredge for landings alongside.

It is estimated that the total annual expenditure of the City of Chicago on the Chicago River is $350,000, of which about $120,000 is for dredging. This latter work is the only work that can be said to be in the interest of navigation.

The expenses for pumping of sewage, for bridges, for lighting and fire service, and other expenditures, are the necessary costs of encroachments upon this public highway to be paid by the profiting parties.

The dredging also is to remove solids and filth passed by the city into this navigable stream, contrary to the
2369 laws of the United States. It is necessary that either the law be enforced and the sewers sealed, or else awaiting a change of system which is not at all contemplated to require that solid matter necessarily placed in the river by the citizens of Chicago shall be removed by them before accumulating to such an extent as to obstruct navigation.

General Remarks.

Chicago River is the most important navigable stream of its length on the globe. In the number of arrivals and departures of vessels annually it leads all harbors of the United States in tonnage it is second only to New York. In these elements it is the head of the great commerce of the lakes, but in capacity, depth, and width of navigation it is but a third-class port. Improvements are in progress along the chain of Great Lakes contemplating 20 to 21 feet depth of water at low water. Several harbors have 18 feet or more depth of channel.

Chicago Harbor has 16 feet at entrance to the river, is obstructed by three tunnels with from 16 to 18 feet of water over their crowns, and can carry through but a comparatively small part of its navigable channel exceeding 15 feet. The entire inner harbor can be regarded as only a long private slip; there are no public wharves or docks, throughout its length, including branches; it is an offensive though navigable open sewer, obstructed by an average of four bridges to the mile, and lined for a greater part of its course by wooden docks in great part built up to the waters' edge by heavy buildings, elevators, etc., that will not admit a channel against them exceeding 16 to 18 feet without damage. The docks are generally of cheap construction of piles and sheet piles reaching but a few feet below the bottom of the channel existing when they were constructed but anchored back into the bank to other piles by iron tie rods about 1 and ½ to twice the channel depth in length. The docks are backed with earth. In many cases, as stated, over these cheap docks, but on foundations of additional tiles are constructed warehouses, etc., that may be more or less damaged by dredging close to the dock line to deepen the channel.

The river at numerous points, notably near Adams and Van Buren streets, has been contracted by filling within the meandered lines to less than one-half its original width. At other places in rebuilding docks, new docks have been constructed outside the first dock line. Abutments of bridges also project into the river, and piles or
2370 rip rap stone have been placed in the stream to buttress insufficient bulkheads or docks. Bends in the river now rigidly fixed by docks, of curvature with chords of sufficient length to allow the free passage of vessels of dimensions of twenty years ago, taken in connection with obstructive bridges prohibit passage by the largest modern vessels.

At the same time the increasing value of lands for other purposes near the mouth of the river is causing grain elevators, coal yards, lumber yards and manufacturing establishments, dependent upon marine transportation either to recede farther and farther from the mouth of the river, or to go elsewhere. Some establishments have moved to South Chicago, and Waukegan and Milwaukee have also profited at the expense of Chicago.

Consequent upon this recession, vessels must pass an ever-increasing number of obstacles in reaching places of transfer of cargoes. Tugs, often two of them to a vessel,

must be employed in all movements of vessels in the river above the junction of the two branches, and it is averred by prominent vessel owners that the cost of moving one of the larger vessels from the lake to the elevators above Twenty-second street and returning it to the lake is one-half the cost of transferring the cargo from Chicago to Buffalo.

This excessive cost, due entirely to the obstructions in Chicago River, is shown by differential freights on coal and other heavy commodities to other harbors on the Great Lakes, comparing mileage and rates, against Chicago.

In the present condition of Chicago River no material widening or deepening of the channel can be effected without great expense. A large proportion of the docks or bulkheads must be constructed, and in some cases precautions are necessary to prevent damage to buildings if the water is materially deepened against their foundations.

There should always be at least 2 feet of water between the bottoms of vessels and the crowns of tunnels to guard against damages to vessels by chance obstructions of small extent lodging temporarily over the rigid crowns. To secure 18 feet available water the three tunnels under the river should be lowered until there will be from 20 to 21 feet of water over their crowns. If the improvement be made on the basis of 18 feet and the use of Chicago River and its branches be conceded by the United States to the State of Illinois as a drainage channel, of the capacity indicated by the State law,
2371 the modifications therein must be radical and costly whether the expense thereof be borne by the United States or the City of Chicago.

Heretofore, under recent river and harbor acts, the United States Government has exercised a limited control over Chicago River. It has been simply a conservative control, the United States intervening only where encroachments prejudicial to the rights of the public in the navigation of Chicago River were in question. Plans for bridges across Chicago River have been acted upon by the Secretary of War, and at least one bridge, *i. e.*, that bridge originally constructed at Canal street, has been condemned as an obstruction to navigation by the War Department and has been altered or changed by the City of Chicago upon the mandate of the Secretary of War, but not in exact accordance with that mandate

either as to plan or time. The Secretary of War has not exercised his authority under the law to stop the deposit of filth in the river, nor interfered in any way with the regulations of the city with reference to the movement of vessels and bridges in or over the stream or with local police regulations relating to this stream.

In the opinion of the engineer officer in charge of this district, for the present awaiting developments of local plans under State authority, no improvement in Chicago River should be made by the General Government; nor any public funds be expended thereon so long as the City of Chicago uses it as a dumping ground for its filth and refuse of all kinds. The City should be required to remove all deposits made therein that tend to diminish its present navigable capacity, or to cease depositing its sewage therein.

This disposition of its sewage and deposit is now a necessity to this city and it is not in accord with public policy to prevent it as long as the city continues to remove the solid residue. The United States should continue its control so far as to preserve the navigation of the river from injury.

It will soon be necessary for Congress to provide for the extension to Lake Michigan of the navigation established on the Illinois River below La Salle, and to determine to what extent, if at all, it will utilize for navigation the great channel now being cut by local authorities in the rock divide, separating Lake Michigan from the Mississippi Valley. The question is at hand and must be determined at some date not far in the future, whether the national highway will utilize this cut and Chicago River as part of this communication, or the Calumet River route in connection with this local channel, or other-
2372 wise. There are no other practicable routes. If Chicago River be adopted (which is not, in the opinion of the officer in charge, in view of the rapid extension in territorial area as well as in population of this city, advantageous to either the local population for drainage purposes or for the United States for navigation), material improvements in the Chicago River channel will be required, but as before stated, even if Chicago River be utilized, the most direct channel for navigation is not the channel demanded by the necessities for drainage by the City of Chicago. If navigable channel must be arranged to best subserve local purposes, it is evident that material modifications will be required in Chicago

River that may properly demand other navigable inlets than the one already provided at the mouth of Chicago River.

It seems, therefore, that before making appropriations for the improvement of Chicago River, the question of the future uses of this stream should be settled, whether it shall continue to be as now simply a long slip or succession of private slips, docks and wharves, utilized indeed for interstate and foreign commerce, but mainly for private and corporate gain, and for the main sewer of a great urban community, or whether it shall constitute a connecting link under federal control between the navigation of the Great Lakes and that of the Mississippi River and tributaries.

This opinion is given as required by the law of July 13, 1892, but for the information of Congress the following is respectfully submitted:

To reasonably accommodate existing commerce without extensive changes in Chicago River and without reference to future developments, the following work would be in the interest of commerce and navigation:

First. That the Chicago River from its mouth to the stock yards on the south branch and to Belmont avenue on the north branch as far as may be permitted by existing docks and wharves be dredged to admit passage by vessels drawing 16 feet of water.

Second. All encroachments on the stream by docks within the original meandered lines of the streams obstructive to navigation, as it exists today, should be removed at the expense of the encroaching parties, and obstructive bridges be required altered or changed.

To admit the passage of the largest lake vessels drawing not exceeding 16 feet of water at load draft, with no changes in the dock lines beyond the obstructive abutments of bridges and projecting obstructive angles
2373 of docks, will require 1,200,000 cubic yards of dredging, approximately, and 8,000 linear feet of docking, at an expense of about $700,000, first cost, with an annual charge for dredging of from $80,000 to $120,000 to maintain the channel.

The cost of maintenance, for reasons stated above, should evidently be borne by the City of Chicago as long as sewage is emptied into the river and the United States should be released from all damages to property by reason of the improvement in Chicago River, as required on the Calumet River.

Should a discharge of 250,000 cubic feet per minute be required through the south branch and main river, wholesale modification of bridges, tunnels and docks, and a widening of the river at many points will be required, and deepening to at least 18 feet of water below Chicago city datum with a slope necessary for this discharge, will be required at an estimated cost of $6,000,000, primarily, not including consequential damages, and an annual expenditure for maintenance of from $60,000 to $75,000.

In 1895, the United States Engineer, Captain Marshall again reported to the Chief of Engineers War Department (Chief of Engineers Reports, 1895, Appendix J. J., p. 2715, Rec. Vol. IV, 2373):

"Extract from the Chief of Engineers Reports 1895, Part 4, Appendix J J, p. 2715, being report of Capt. W. L. Marshall, United States Engineer at Chicago in charge of Chicago River and Illinois River referring to the improvement of the Illinois River. Captain Marshall said:

The City of Chicago expects to turn into the channel of the Illinois at some future time 5,000 cubic feet of Lake Michigan water per second; at some more remote period there may be 10,000 cubic feet per second, but not probably within a generation. By law it is now required to pump 1,000 cubic feet per second into that channel, so that we may expect 4,000 cubic feet per second additional discharge given to the Illinois River at low water. Discharge measurements on the Illinois show conclusively that this amount of water, or even the maximum discharge, will not produce a channel without dredging or without locks and dams equal in depth to that easily attained now at very small expense by completing the dredging required. Under any probable condition an equal or nearly equal amount of dredging will be required to give an equivalent channel in the Illinois River.
2374 The proposed discharge (5,000 cubic feet) will increase the depth of water over the crest of the Kampsville dam at low water about 8 inches, and the depth over Six Mile Bar near the mouth of the Illinois but little if any more. A low-water channel 7 feet deep will exceed in depth very materially the low-water capacity of the Mississippi River, and there can be no rational demand for one of greater capacity.

In 1895, the Board of Engineers appointed by the Secretary of War to investigate the effect of the Sanitary District Channel then being constructed addressed a letter to the Sanitary District which communication was as follows (Rec. Vol. IV, p. 2380):

"Hon. Frank Wenter, President of Board of Trustees, Sanitary District of Chicago, Chicago, Ill.:

Sir—The Board of Engineers appointed by direction of the Secretary of War to consider and report upon 'the probable effect of the operation of the Chicago Drainage Canal upon the lake and harbor levels and upon the navigation of the Great Lakes and their connecting water ways' would be pleased to receive from your Honorable Board of Trustees any information or data bearing upon the subject submitted to us, and especially the following:

First—The conclusions arrived at from investigations made by your attorney or by others as to the effects upon the levels of the great lakes by the operation of your Canal, including any mathematical analyses and discussions of the question from which these conclusions have been arrived at.

Any references to printed discussions by titles, etc., will be very much appreciated if copies cannot be furnished.

2381 *Second*—Description of the Canal, including dimensions of wetted perimeter, slopes, and character of material through which excavated.

Third—Whether any part of the inner harbor of Chicago, which includes Chicago River and its branches, will be utilized as part of the proposed Canal, and if so what amount of water you propose to take through these river channels.

Fourth—If Chicago River be utilized, what changes you propose to make in the navigable channels of the river, in dimensions, slopes and structures to adapt them to your purposes; and what additional channels of supply other than the main branch of the Chicago River; which is now the only evident connection between Lake Michigan and the proposed canal, your Board proposes to make.

In making these inquiries, the Board of Engineers consider that your Honorable Body is much interested in the solution of the questions submitted to us, and therefore desirous to aid as far as practicable in arriving at correct conclusions.

Any communications you may desire to make should be addressed to me at Detroit, Michigan,

Very respectfully,
Your obedient servant,
(Signed) O. M. Poe,
Colonel, Corps of Engineers."

On August 16, 1895, The Board of Engineers of the War Department made a report on the effect of the opening of the Sanitary District channel, which report was as follows (Rec. Vol. VI., p. 3931, 3940):

3932 Chicago, Illinois, August 16, 1895.

Brig. Gen. William P. Craighill,
Chief of Engineers, U. S. A.,
Washington, D. C.

General:

The Board of Engineers appointed by virtue of S. O. No. 14, C. S. Corps of Engineers to consider and report upon 'the probable effect of the operation of the Chicago Drainage Canal upon the lake and harbor levels and upon the navigation of the Great Lakes and their connecting waterways' submits the following report:

The Board met in Chicago, August 12, 1895, and on the 13th and 14th accompanied the officers of the Drainage Canal over the line under construction. Every facility and courtesy possible has been extended by the trustees and engineers of the canal for a full investigation of the subject matter. A brief description of the canal is extracted from the printed report furnished the Board by these gentlemen.

The Main Drainage channel of the Sanitary District of Chicago is now under contract from its confluence with the South Branch of the Chicago River, at Robey street, in the City of Chicago, to its southern terminus, in Will County, Illinois. At the southern end of the channel the

controlling works will be located. Beyond these works, the construction contemplated by the District will be the work necessary for conducting the flow from the channel in conjunction with the waters of the Des Plaines River down the declivity to and through the City of Joliet, and making such changes in the Illinois and Michigan Canal as the new conditions developed will make necessary.

The first work put under contract extended southwesterly from the Willow Springs road, and these sections were numbered consecutively Nos. 1 to 14. Average length of sections, 1 mile. Easterly from Willow Springs road, the sections are lettered from A to O, omitting J. The lettered sections are, except for a short distance near Summit, entirely in glacial drift, defined in the specifications thus: 'Glacial drift shall comprise the top soil,
3933 earth, muck, sand, gravel, clay, hard pan, boulders, fragmentary rock displaced from its original bed, and any other material that overlies the bed rock.'

The sections from 1 to 14 were put under contract in July, 1892; from A to F were put under contract late in 1892, and early in 1893; and G to M, inclusive, were contracted for in December, 1893. Sections N and O were put under contract May 2nd, and section 15, August 27th, 1894.

Earth was first broken on 'Shovel Day,' September 3rd, 1892, on the Rock Cut below Lemont.

The Des Plaines valley is traversed by the river from which it takes its name—a stream of wide fluctuations with no constant and reliable fountain supply. During some seasons its whole discharge would pass through a six-inch pipe, and at others its volume reaches 800,000 cubic feet per minute. Then it rolls majestically along, flooding the whole valley. Such being the situation, control of this stream was a condition precedent to the successful prosecution of the work upon the main Channel. This control has been secured by the outlay of nearly $1,000,000 in constructing what is known as the River Diversion Channel.

About 13 miles of new river channel had to be excavated with the location of the Main Drainage Channel, and about nineteen miles of levee built to divorce the waters of the Des Plaines watershed from the channel which is to receive the waters of Lake Michigan and pass them on to the Mississippi River, via the lower Des Plaines and the Illinois Rivers. The width of the River Diver-

sion Channel on the bottom is 200 feet, side slopes 1½ to 1, grade generally 12-100 per 1,000 feet.

At the head of this River Diversion it was necessary to provide a safety valve in the form of a spillway, to allow surplus water to flow towards Chicago, because arrangements have not as yet been perfected for carrying the entire flood waters of the Des Plaines through Joliet.

This spillway is a concrete dam capped with cut stone, and its wings faced with stone masonry; it is 397 feet long and its crest is 16.25 feet above Chicago datum (this datum is referred to the low water of Lake Michigan of 1847, and is 579.61 above sea level at Sandy Hook). No water flows over this spillway until the volume passing the water gage above it reaches 300,000 cubic feet per minute.

The cross-section of the earth sections from A to E inclusive is 202 feet on the bottom, side slopes two to one.
3934 This section extends for about 500 feet into the west end of F and then reduces to 110 feet on the bottom, preserving the same side slopes. The explanation for this change of cross-section is as follows: Throughout the rock sections, and those sections in which there is a preponderance of hard material, or where rock may appear, the section adopted is designed according to law for a flow of 600,000 cubic feet of water per minute, which means provision for a population of 3,000,000 people. The narrow channel provides for a flow of 300,000 cubic feet per minute, or for about the present population of Chicago. The enlargement of the narrow channel can be made by the easier method of excavation, such as dredging; whenever the needs of the city require it. The grade throughout the lettered sections is one foot in 40,000 (.025 per 1,000 feet) and the bottom of the channel at Robey Street is 24.448 feet below datum. The numbered sections from No. 1 to No. 6 inclusive are underlaid with solid rock. The width of the bottom in rock, is 160 feet, and walls of masonry laid in cement will be built upon the rock surface to a height of five feet above datum. Section 7 to 14, inclusive, are in solid rock; width at bottom 160 feet, sides vertical, prism taken out in three stopes with offset of six inches on each side for each cut, making top width of 162 feet; grade in rock 1 foot in 20,000 (.05 per 1,000).

Section No. 15 is also in rock and its cross sections is enlarged at its south end so as to form a 'windage basin' in which large vessels may be turned around. The controlling works are located on this section. These works

will consist of gates or movable dams by which the flow of water from the Main Channel into the tail race, which is to deliver the outflow into the Des Plaines River, can be controlled.

This river below Lockport follows the trough of the valley down a steep declivity to the canal basin in Joliet. The fluctuations in Lake Michigan, by varying slope of water surface, will be felt at the controlling works, and provisions must be made to meet these fluctuations within a range of five feet above datum and eight feet below, or an extreme oscillation of 13 feet. The fall from datum at the controlling works to the level of the upper basin will be about 42 feet, in a distance of about 4⅓ miles. As the plans for controlling works have not been finally adopted by the Board of Trustees they cannot now be discussed.

The total amount of excavation involved in the construction of the Main Channel is 26,077,765 cubic yards of
3935 glacial drifts and 12,071,668 cubic yards of solid road, or an aggregate of 38,149,433 cubic yards, to which must be added the material excavated from the River Diversion; glacial drift, 1,564,403 cubic yards; solid rock, 258,926 cubic yards; total River Diversion, 1,823,329; grand total Main Channel and River Diversion, 39,972,762 cubic yards. All of this work is now under contract and in addition thereto 384,958 cubic yards of retaining wall.

In response to the request of the Senior Member of the Board the Board of Trustees of the Sanitary District of Chicago has furnished a report on Lake Level effects on account of the main channel of the Sanitary District of Chicago containing briefs by Trustee L. E. Cooley, C. E., and by Thos. T. Johnston, Assistant Chief Engineer, accompanied by numerous blue prints.

These papers present a full discussion of the subject as viewed by the canal officials, and will be found in the Appendix marked A.

What Is the Outflow of the Lower Lakes?

In November, 1891, the Chief of Engineers U. S. A., at the request of the Secretary of the American Society of Civil Engineers (who had been asked by the Chief Engineer of the Montreal Harbor Commission of Canada, to suggest the subject), ordered a set of observations made to determine the amount of water flowing down the Niagara River. The time was especially propitious as the water was then very low.

The results of these measurements were somewhat unexpected, and they were repeated in May, 1892. The second set corroborated the first, and the whole formed the subject of a report to the Chief of Engineers, which appeared in his annual report of 1893, page 4364, and following. But, as the subject was important, the 'Engineeering News' anticipated the appearance of the official report by publishing in its issue of March 8, 1893, this report, with the permission of the Chief of Engineers. This publication was the first ever made in which as a result of careful measurements a relation between the level of the lakes, and their outflow, or discharge, had been established and given to the public. Prior determination of this discharge had not attempted to detect this relation, and nothing more than a general determination of a season's work had been published.

In all plans for the Chicago Drainage Canal the early measurements had been taken, and those studying the subject chose such isolated figures as suited them best.

3936 The report of 1892, being so late in appearance, long after the Drainage Canal was put under construction, escaped the notice of many who are interested in navigation, for two reasons. Some were too busy to see anything, unless specially brought to their notice. Others thought the whole matter already fully canvassed, and settled. It is true there is nothing showing that the consent of Congress had been asked, for this enterprise. Certain that the subject had not been treated as an Interstate affair; to say nothing of its being an International affair. The United States has always been slow to move; with its many sleeping rights it has for many years been loath to exercise them. Not till 1888 did it begin to exercise positive legislation over its navigable waters in order to preserve them for all its citizens. Each River and Harbor bill since then is found to have sections strengthening the hands of those who wish to keep the waterways open, and in good order for all classes of navigators. Not till 1890 had any prohibitive clauses been enacted into laws forbidding, for example, the destruction of channels by improper dumpings. Saw mills went their own unchecked way every year clogging up the streams. Railroads bridged all smaller streams, in the states, without interference from the United States. Many other features can be quoted. But it is sufficient to say that all that is now changed. The adopted policy is to defend, as well as improve all water courses, now navigable, or probably navigable in the reasonably close future. Wa-

terways are under the charge of the United States, and there is no likelihood of their being abandoned for some time to come.

With this an established fact it is impossible to think that U. S. supervision shall not be extended to the Chicago Drainage Canal in due time. Under whatever law built, and for whatever purpose constructed, just so soon as it is shown that that canal affects, or becomes a part of the system of navigable waterways of the United States some supervision or control of it must follow. When boats use it for harbor purposes; when its waters add to the Illinois River, or take from the lakes, they alter natural conditions and the matter rises for consideration under national authority.

The water levels of the Great Lakes are very delicate. Storms, barometric changes, rainfall, even tidal changes are felt. Records show at Buffalo no less than 13 feet as a total possible change, between the lowest and the highest gage readings. Each lake is a basin. The water is constantly pouring in from not only one, but several
3937 inlets. The overflow, however, is now always out of the one outlet provided for that purpose; the second one formerly at Chicago, has been plugged up.

As in our basins when the water rises enough to take two, three, or more of the small holes to carry it off, it is always to be noted that those holes are always carrying that surplus off. They do not wait until the water has time to pass from one end to the other. In the same channel the head alone governs the rate of outflow, and that head is measured by the gage reading at the outlet. The supply of water in the lake: The net supply, allowing for evaporation, is the sole cause of the outflow. That supply depends solely upon rainfall, but the lake when it receives more than it has been receiving must discharge more. When it has less there is less to run out. If the outlet be dug down, or new ones made the water runs off faster than it ran off before.

The outflow is instantly affected by a changed inflow; Provided there is enough such to increase or reduce the head. If we have a rainfall of one inch over the lake area (and such are not uncommon events), there is a head of one inch to run off. But if there are two outlets to run out of, instead of one this inch must run off sooner than through the one.

If the new outlet should reduce the levels of Lake Michigan and Huron about 6 inches this effect will be

produced in full in about two years; it is not then a question of many years as some suppose.

We may feel very sure, therefore, that in this question two points are certain.

1st. The drainage canal is not solely a State affair; but a national one.

2nd. The tapping the lakes must affect their levels. But it is said, first, that the changes in levels does not concern shippers, and then that at most the affects will be trifling.

If one watched carefully the course pursued by shippers one would see that as a rule each vessel carries all that it can take, and get out of its port, or into that it intends to reach. Vessel owners, and managers are very shrewd, watchful men. They know what they can safely carry allowing for storms, and short detentions arising from passing causes. They average pretty well the practicable depths, and carry all the channels will stand. They are as conversant as are theorists about the effects of storms, but they keep good watch on ruling depths. Now should it be certain that these average depths were reduced three
3938 inches, or six inches, they must load accordingly. And not only the large boats, but also the small ones using the small harbors that the large ones cannot go into. All must lose the three, or six inches, as it may be; and not for one, or more trips, but for all trips, and for all time; a diminution of capacity is not a single tax, but a continuous one. A vessel that when light draws six feet, and loaded twelve feet, must lose three inches out of 72, say four per cent in capacity each loading; a vessel drawing 12 feet light and 20 feet loaded, would lose somewhat over three per cent in capacity at each end every loading.

Should the loss of levels be six inches instead of three, then these figures become doubled. Will the loss be six inches or will it be three? This is an important question and we have only the Niagara River discharge observations from which to answer it. These cover a range of about 1 foot and eight-tenths. There were scattering observations outside these limits, but the mass of results was secured between gage readings, mean lake level, the highest, and—1. '85. The 'smooth curve' as published enables us to note the fall of 0′ .53 on the gage per 10,000 cubic feet per second for the first foot of fall and 0′ .44 for the whole.

These observations, especially at the lower readings are erratic and indicate a need for more measurements, especially at these levels. This lower portion of the gage should be studied and additional observations made, and the Board is a unit in suggesting the importance of a series of gaging of the St. Clair River at the present time for this purpose, and to furnish additional knowledge of the relation between gage readings, and discharge. The subject is of such general bearing upon the navigation of the lakes, that it demands careful treatment, and full data. The Niagara data do not show how much Lakes Huron and Michigan would be lowered, even if 0'53 were the net loss to Lake Erie. The opinion expressed by Mr. Johnson that the effect on the two upper lakes would be some 15 per cent greater than upon Erie would seem to point to a probable loss of say 0'61. This possible loss of seven inches certainly is important enough to justify careful measurements of the discharge through the St. Clair. It is true that the law as it stands, and the intention of the Trustees contemplates the abstraction of only 300,000 cubic feet under present conditions, but after the canal is opened measurements would not be so instructive, and we must assume that ultimately the entire 600,000 cubic feet per minute will be drawn from Lake Michigan as required by the State Law.

3939 The abstraction of 10,000 cubic feet of water per second from Lake Michigan will lower the levels of all the Lakes of the system except Lake Superior and reduce the navigable capacities of all harbors and shallows throughout the system to an extent that may be determined, if at all, by actual measurements only. Under the laws of the United States these changes in capacity cannot be made without Federal authority, and to enable the executive officers of the United States to act advisedly in the matter it is necessary in the opinion of the Board not only that these measurements be taken but that the money cost of restoring the navigable depths in channels and harbors be carefully estimated.

In this connection the Board submits without expression of opinion an estimate prepared by Mr. Charles H. Keep, Secretary of the Lake Carriers Association, of the commercial losses in carrying capacity of the Lake fleet of one, three or six inches.

(Appendix Marked B.)

The Board notices that the same peculiarity exhibited by the Niagara discharge curve, is pointed out by Mr.

Johnston as existing in the Morris, Ill., and South Branch Chicago River curves. (See page 25 Appendix A 1.)

The Board also notes Mr. Johnston's conclusions on page 23, Appendix A-1, that 'applying the reasoning to the St. Clair and Detroit Rivers, then the value of Q'—Q may be taken from the diagrams illustrating the tables before described, the only uncertainty being as to the value of 'd.' Suppose 'd' to be unity, and the mean depth 20 feet. Then Q'—Q will equal something greater than 20,000 cubic feet per second," which practically corresponds with the deductions made from Niagara River observations.

So many uncertainties arise in the application of hydraulic formulae that the only way to ascertain the approximate discharge of these streams is to measure them for periods long enough to eliminate accidental fluctuations and to cover all stages.

While the navigable capacity of all harbors and channels on the Great Lakes below St. Marys Falls will be injuriously affected by a diminution in depth, the navigability of the inner harbor of Chicago will be diminished also by the introduction of a current therein, which in the present condition of the river even with the minimum
3940 flow of 5,000 cubic feet per second or 300,000 cubic feet per minute is entirely inadmissible. The estimates of the effect of the Drainage Canal upon this harbor should also consider this element.

The Board of Trustees have not yet determined upon a plan of treatment of this navigable channel, and their plans may be such as may improve, impair or destroy its utility as a navigable river.

All of which is respectfully submitted.

O. M. Poe,
Col. Corps of Engineers,
Br. Brig. Genl. U. S. Army.

E. H. Ruffner,
Major of Engineers, U. S. Army.

W. L. Marshall,
Major Corps of Engineers."

On June 16, 1896, the Sanitary District of Chicago applied to the Secretary of War for a permit to improve the Chicago River in order to secure the necessary water through the Chicago River to make available the artificial channel

then under construction, a map accompanied the request showing just what work the Sanitary District proposed to do in the Chicago River, said letter is attached to the answer, as Exhibit H. (Rec. Vol. VIII, pp. 120, 121; This Narrative p. 88.) Under date of July 3, 1896, Joseph P. Doe, Acting Secretary of War, approved the plan submitted. (Rec. Vol. VIII, p. 121.)

"July 3, 1896.

Sir: I have the honor to acknowledge the receipt of your letter of 16th ultimo, requesting permission to make certain changes in the capacity of the channel of the Chicago River for drainage purposes at points indicated on the map accompanying the application, and in reply beg to say that upon investigation it is found that the permission requested can be granted upon the following conditions:

1. That while the general plan is approved, the Sanitary District of Chicago must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass and each new dock or wharf proposed to be built, in order that the Secretary of War may act intelligently in each case.

2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must hereafter be submitted for consideration."

November 16, 1897, pursuant to request of the Sanitary District, the Secretary of War issued a permit to widen the Chicago River between Quincy and Harrison streets in certain respects. The request and permit are as follows (Rec. Vol. VI, pp. 3575, 3576):

"B. A. Eckhart, Esq.,
President The Sanitary District of Chicago,
Rialto Building,
Chicago, Ill.

The Sanitary District of Chicago.

Chicago, October 28, 1897.

To the Hon. Russell A. Alger,
Secretary of War,
Washington, D. C.

Sir:

I have the honor of transmitting to you through Maj. W. L. Marshall, Corps U. S. Engineers, plats showing the proposed widening of the Chicago River between Quincy and Harrison streets, to conform to the plans of this District for securing an adequate flow of water through the said stream. Our general plans have been heretofore submitted to the War Department and in the communication under date of July 3, 1896, signed by the then acting Secretary of War, Joseph B. Doe, have received a qualified approval subject to the general requirement that plans for each separate division of the work shall be submitted for specific approval. We respectfully ask your approval of the plans now transmitted.

Very respectfully,

Thomas Kelly,
President.

1st Indorsement,

U. S. Engineer Office,

Chicago, Ills., October 29, 1897.

Respectfully forwarded to the Chief of Engineers U. S. A.

The works indicated are by-passes and docks indicated on the general plans conditionally approved by the Acting Secretary of War, July 3, 1896. (E. D. File No. 15715/5).

As these works make possible a material improvement in the capacity of Chicago River for navigation in the vicinity of Adams and Van Buren streets, I respectfully recommend that the necessary authority to do the work be granted by the Secretary of War, subject to all the conditions attached to the original authority dated July 3, 1896.

W. L. Marshall,
Maj. Corps Engrs.

3576 Form No. 5.

Whereas, by Section 3 of the Act of Congress, approved July 13, 1892, entitled 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors and for other purposes,' it is provided that, without the permission of the Secretary of War, it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty or structure of any kind outside established harbor lines or where no harbor lines are or may be established in any port, homestead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters; or to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of any port, roadstead, haven, harbor of refuge, or inclosure within the limits of any breakwater of the channel of any navigable water of the United States, unless approved and authorized by the Secretary of War;

And whereas, the Sanitary District of Chicago has submitted to the Secretary of War for his approval the attached plans for the widening of the Chicago River between Quincy and Harrison streets of said city, by the construction of by-passes and docks;

Now, Therefore, This is to certify that the Secretary of War hereby approves and authorizes the work shown on said plans upon the following conditions:

1. That while the general plan is approved, the Sanitary District of Chicago must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass, and each new dock or wharf, proposed to be built, in order that the Secretary of War may act intelligently in each case.

2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must be hereafter submitted for consideration.

3. That it will not cover obstructions to navigation, by reason of this work while in progress, or when completed.

4. That the United States shall not be put to expense by reason of this work.

5. That this authority shall expire by limitation in two years from date unless extended.

Witness my hand this 16th day of November, 1897.
R. A. Alger, Secretary of War.
(War office Seal.)"

November 30, 1898, the Secretary of War granted a permit pursuant to the request of the Sanitary District to construct a coffer dam around the east side of the center pier of the Adams Street Bridge, in connection with the improvement of the Chicago River. (Rec. Vol. VI, p. 3578.)

January 13, 1899, pursuant to the request of the Sanitary District, the Secretary of War granted a permit to remove Taylor Street Bridge across the Chicago River. (Rec. Vol. VI, p. 3580.)

March 10, 1899, permit was granted by the Secretary of War for the erection of a bridge at Taylor street in connection with the river improvement. (Rec. Vol. VI, p. 3585.)

May 12, 1899, pursuant to the river improvement plan, permit was granted by the Secretary of War to construct a coffer dam along the west side of the Chicago River at certain place. (Rec. Vol. VI, p. 3582.)

On February 9, 1898, the Sanitary District of Chicago invited the Committee on Rivers and Harbors of the House of Representatives to make an inspection of the Chicago

River and the main channel of the Sanitary District then nearing completion. (Rec. Vol. IV, p. 2381.)

On February 23, 1898, the Committee made the investigation. (Vol. IV, p. 2382.)

On April 24, 1899, Major Marshall, of the Corps of Engineers of the United States Army, acting as United States Engineer at Chicago, wrote to the Chief of Engineers recommending that a permit to open the main channel of Sanitary District be issued by the Secretary of War and Chief of Engineers. His report is as follows (Rec. Vol. VI, pp. 3586-3588):

"United States Engineers Office,
#1637 Indiana Ave., Chicago, Ill.

April 24, 1899.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.,
Washington, D. C

General:

I have the honor to report as follows on the application of the trustees of the Sanitary District of Chicago for authority to open their drainage canal. It is a strange fact that this city has expended, or will expend, over $30,000,000 with the intention of diverting an apparently unlimited amount of water from the Great Lakes to the Mississippi drainage area for sanitary purposes without finding out whether such diversion would be allowed by the great interests of the United States and the Colonies of Great Britain along the chain of Great Lakes in the navigation of the rivers and harbors of the Great Lakes. Now, they ask the authority of an executive officer of the United States to open a channel that will to some unknown extent, lower the levels of all the Great Lakes below Lake Superior and of their outlets, introduce a current also unknown and not to be ascertained otherwise than by actual experiment, in Chicago River, the most important navigable river of its length on the Globe, but which is already obstructed by bridges, masses of masonry and bends, and of difficult navigation at best.

The possible effects of this diversion are not known further than that to some unknown degree they will be injurious. Whether the amount of this injury will be so small as to be accepted by the interests affected, in view of the manifest advantages to and apparent necessities of their neighbors, cannot be determined by other than the interests themselves.

It is clear to me that I am not competent to make a recommendation as to what should ultimately and definitely be done.

3587 The matter of what effect the opening of this channel would have on the levels of the Great Lakes has been heretofore submitted to a Board of Engineers. The Board reported that the Great Lakes would be lowered, but that there was not sufficient data to determine the exact effects of the proposed discharge, and recommend extended investigations, which it is believed are being carried on now by the Deep Waterways Commission or Board. They have not reported. In my opinion the abstraction of from 300,000 to 600,000 cubic feet per minute will permanently lower Michigan, Huron and Erie from three to eight inches; not more than eight nor less than three, corresponding to an extreme reduction of from 160 to 466 tons in carrying capacity of the large vessels of the lakes, and that it will take from three to four years for this full effect to be obtained. But the state law is unlimited in its requirements. 20,000 cubic feet per minute must be taken from Lake Michigan for each 100,000 population of the District; already nearly 400,000 cubic feet must be taken, and at the same ratio of increase for a few decades, in a very short time there must be taken 1,000,000 c. ft. per minute under this indefinite law. The amount should be limited and the injurious effect stopped somewhere.

The mean current to be introduced in Chicago River upon the opening of the canal is estimated by the Engineers of the Drainage Board at 1¼ miles per hour, or 110 feet per minute. This is simply an assumption that with such velocity in an unobstructed river, the amount of 300,000 cubic feet per minute can be discharged through Chicago River,—but I have seen this river so jammed with vessels, drawing all the water that is in it, —that by leaping from deck to deck I could cross the river. What the velocity would be in such conditions, with Lake Michigan on one side and a great fall on the other side of such vessels, no one knows. But it is a

simple mathematical problem to determine the effect on steel-plate vessels of from 2,000 to 4,000 tons mass drifting upon or striking stone piers with a velocity of near 2 feet a second. They will go to the bottom.

Individually I have to say that I am in entire sym-
3588 pathy with the people in their effort to purify their water supply. I have lost my only son from typhoid fever, produced, I believe from drinking water polluted by defective drainage at Chicago, which this channel will correct. In every proper way I have aided the officers of the Drainage District. I would like further to aid them, but I believe this question to be entirely out of my sphere, and too great and important for me even to venture an opinion or make a recommendation about. Yet I may venture to suggest that the entire subject be referred to Congress for final solution, and that a conditional permit or authority be granted to the authorities of the Chicago Sanitary District by the War Department, awaiting action by Congress, to open their channel, and under the following conditions:

1st. That if, at any time, it becomes apparent that the current created by such drainage works in the South and Main branches of Chicago River, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

2nd. That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago River. With 300,000 cubic feet per minute discharge, it will take one year to lower the level of Lakes Michigan and Huron 1/10 of a foot, and several years to reach the maximum permanent effect of this discharge, which will not probably much exceed three inches, so that the main injury to navigation, if any that can be expected before action by Congress, will be in Chicago River, and that can be at once abated.

All the changes made by the Sanitary District of Chicago, taken by themselves, have been such as to increase the navigable capacity of Chicago River. Taken in connection with the current to be introduced I am not able to say that the river will be as navigable as it was before these changes were made. The changes materially lessen

the probable injury to navigation of this current, at the points where the changes have been or will be made.

I believe their channel will be entirely under control and that if the discharge be injurious it can be at once and at any time shut off, and it is evident that the War Department should preserve the right to control the current and discharge through the Controlling Works of this channel.

Very respectfully,
Your obedient servant,
W. L. Marshall,
Maj. Corps of Engineers, U. S. A."

On May 8, 1899, pursuant to the recommendations of Major Marshall and the Chief of Engineers, the Secretary of War issued a permit for the opening of the Sanitary District Channel. (Rec. Vol. VIII, pp. 44, 45; Narrative p. 21.)

Whereas, by Section 10 of an act of Congress approved March 3, 1899, entitled 'An Act making appropriations for the construction, repair and preservation of certain public works, on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to alter or modify the course, location, condition or capacity of the channel of any navigable water of the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same:

And whereas, the Sanitary District of Chicago, a municipal corporation, organized under the laws of the State of Illinois, has constructed an artificial channel from Robey street, Chicago, to Lockport, and has been heretofore granted permission by the Secretary of War to make certain improvements in the Chicago river for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of one and one-quarter miles an hour, it being intended to connect the said artificial channel with the west fork of the south branch of Chicago river at Robey street in the said City of Chicago.

And whereas, The said Sanitary District of Chicago has now applied to the Secretary of War for permission to divert the waters of the said Chicago river and cause

them to flow into the said artificial channel at Robey street as aforesaid;

And whereas, The said Sanitary District of Chicago represents that such movable dams and sluice gates as are necessary to, at all times, secure absolute and complete control of the volume and velocity of flow through the Chicago river have been constructed;

Now therefore, The Chief of Engineers having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said Sanitary District of Chicago to open the channel constructed and cause the waters of Chicago river to flow into the same, subject to the following conditions:

1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

2. That if, at any time, it become apparent that the current created by such drainage works in the south and main branches of the Chicago river, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago river and its South Branch.

3. That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago river.

Witness my hand this 8th day of May, 1899.

R. A. Alger, *Secretary of War.* (Seal War office.)
John M. Wilson, *Brig. Genl. Chf. of Engrs. U. S. A.*"

On January 17, 1900, the Sanitary District Channel was opened, and water has flowed out of Lake Michigan through the Chicago River down the Sanitary District Channel continuously since that day. (Cooley Rec. Vol. III, p. 174; Narrative p. 293.)

On June 20, 1900, Major Willard, United States Engineer at Chicago, made a full report upon the operation of the Sanitary District Channel and its effect upon navigation in the Chicago River. In this report Major Willard said: (Rec. Vol. IV, pp. 2385, 2386):

"There is no doubt that the reversed current in Chicago River has increased the difficulty of navigating it with the large boats now demanded by commerce, but it is a noteworthy and gratifying fact, not unexpected by me at least, that the pilots have been quick to adapt themselves to the new conditions and I have little doubt but that they could handle their boats safely even in greater currents than now obtain.

If I have not overestimated pilots' skill, and considering the immense benefit of the Drainage Canal to the City of Chicago since its opening only a few months
2386 ago, I recommend that no restrictions be placed upon the legal requirements of flow into the Sanitary Canal, unless it should be found absolutely necessary to do so.

The Engineer Department, the City of Chicago, and the Sanitary District are of one mind as to the need of improving Chicago River, and are co-operating heartily to that end, and large sums are appropriated and being expended judiciously by each for the objects in view. The interests of navigation are not only being protected, but are being advanced practically sooner than could be hoped for in the usual course."

On April 26, 1900, the Sanitary District submitted plans for the improvement of the south branch of the Chicago River from Lake street to Ashland avenue and asked the Secretary of War to issue a permit for such improvement. (Rec. Vol. VIII, p. 122; Narrative p. 90.)

On June 7, 1900, the Sanitary District again submitted plans for the widening of the south branch of the Chicago river between 12th street and Ashland avenue to a uniform width of 200 feet. (Rec. Vol. VIII, p. 123; Narrative p. 91.)

On July 11, 1900, the Secretary of War approved the plans and issued the permit as requested on April 26, 1900. (Rec. Vol. VIII, p. 124; Narrative p. 92.)

On July 11, 1900, the Secretary of War also approved the plans and issued the permit as requested in the application of June 7, 1900. (Rec. Vol. VIII, p. 125; Narrative p. 93.)

On April 9, 1901, the Secretary of War issued an order directing the Sanitary District to reduce the flow through the Chicago River to 200,000 cubic feet per minute instead of the withdrawal of over 300,000 cubic feet because of the velocity of nearly three miles per hour in the Chicago River, which was dangerous to navigation in its then condition. (Rec. Vol. VIII, p. 45; Narrative p. 23.)

On July 23, 1901, the Secretary of War amended the order of April 9th, permit the Sanitary District to flow 300,000 cubic feet per minute between the hours of 4 P. M. and Midnight. (Rec. Vol. VIII, p. 46; Narrative p. 24.)

On December 5, 1901, upon application of the Sanitary District the Secretary of War issued a permit authorizing a flow of 250,000 cubic feet per minute throughout the twenty-four hours of the day. (Rec. Vol. VIII, p. 47; Narrative p. 24.)

On January 17, 1903, the Secretary of War issued a permit authorizing the Sanitary District to increase its flow to 350,000 cubic feet per minute until the 31st day of March, 1903 after which date it was to reduce it to 250,000 cubic feet per minute. (Rec. Vol. VIII, p. 48; Narrative p. 25.)

On September 11, 1907, the Secretary of War issued an order approving the plans for the proposed drainage channel to connect Lake Michigan at Wilmette, Illinois, with the north branch of the Chicago River with the provision that the total diversion of water from Lake Michigan should be no greater than already authorized by the War Department. (Rec. Vol. VIII, p. 115; Narrative p. 81.)

On June 30, 1910, the Secretary of War authorized the Sanitary District of Chicago to open the channel from the Calu-

met River to its main channel with the provision that the total amount of water withdrawn from Lake Michigan should not exceed the War Department permit. (Rec. Vol. VIII, p. 116; Narrative p. 82.)

On January 27, 1897, Major Marshall made a preliminary examination of the Upper Illinois River and the Lower Des Plaines River with a view of the extension of navigation from the Illinois River to Lake Michigan at Chicago in compliance with the requirements of the Rivers and Harbors Act of June 3, 1896, which report was transmitted to the Congress of the United States as House Document 353, 54th Congress, 2nd Session. (Rec. Vol. IV., p. 2202.) This letter of Major Marshall is the basis of survey provided by the Rivers and Harbors Act of March 3, 1899.

"54th Congress, 2d Session. House of Representatives.
Document No. 333.

PRELIMINARY EXAMINATION OF THE UPPER ILLINOIS RIVER AND LOWER DES PLAINES RIVER, ILLINOIS.

Letter from the Secretary of War, Transmitting, with a Letter from the Chief of Engineers, a Report of a Preliminary Examination of the Upper Illinois River and Lower Des Plaines River, Illinois.

March 2, 1897.—Referred to the Committee on Rivers and Harbors, ordered to be printed.

War Department,

Washington, D. C., March 3, 1897.

Sir: I have the honor to enclose herewith a letter from the Chief of Engineers dated March 2, 1897, together with a copy of a report from Maj. W. L. Marshall, Corps of Engineers, dated January 27, 1897, of a preliminary examination made by him in compliance with the provisions of the river and harbor act of June 3, 1896, of the upper Illinois River and lower Des Plaines River, Illinois.

Very respectfully,
DANIEL S. LAMONT,
Secretary of War."

2203 "Washington, D. C., March 2, 1897.

Sir: I have the honor to submit the accompanying report of January 27, 1897, by Maj. W. L. Marshall, Corps of Engineers, of the results of a preliminary examination of the upper Illinois River and lower Des Plaines River, Illinois, with a view to extension of navigation from Illinois River to Lake Michigan at or near Chicago, made in compliance with requirements of the river and harbor act of June 3, 1896.

Major Marshall states that the locality embraces an important commercial route between the Great Lakes and the Mississippi River system, and its utility and worthiness have long been recognized by Congress.

The division engineer, Col. Henry M. Robert, Corps of Engineers, is of the opinion that the upper Illinois and the lower Des Plaines rivers are worthy of improvement, and I concur in his views.

It is estimated that the cost of the necessary survey and preparation of detailed plans of improvement will be $75,000.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers, U. S. Army.

Hon. DANIEL S. LAMONT,
Secretary of War."

"PRELIMINARY EXAMINATION OF UPPER ILLINOIS RIVER AND LOWER DES PLAINES RIVER, ILLINOIS, WITH A VIEW TO EXTENSION OF NAVIGATION FROM ILLINOIS RIVER TO LAKE MICHIGAN AT OR NEAR CHICAGO.

United States Engineer Office,

Chicago, Ill., January 27, 1897.

General: In accordance with your letter dated August 11, 1896, I have the honor to submit the following report upon a preliminary examination of 'the upper Illinois River and lower Des Plaines River, with a view to extension of navigation from Illinois River to Lake Michigan at or near Chicago,' directed by the river and harbor act of June 3, 1896.

* * *

The sanitary district of Chicago has nearly completed
2204 a canal for drainage purposes from Chicago River at Robey street to near Lockport from 18 to 22 feet in depth below the proposed water surface, and varying in width from 160 feet in rock to more than 200 feet in earth, a length of 28 miles, which may be made available as part of any enlarged waterway over the route in question, and is of much greater dimensions than required by any commercial canal adapted for the conditions and requirements of present or prospective traffic by water between Lake Michigan and the region along the water courses of the Mississippi Valley. To comply with the law of the State of Illinois under which this drainage canal is constructed — it has been constructed of a capacity to discharge 600,000 cubic feet per minute through the section excavated in rock and 300,000 cubic feet per minute throughout the earth section— the law requires a discharge of 20,000 cubic feet per minute for each 100,000 inhabitants of the drainage district, which at present requires more than 300,000 cubic feet and in a few years will require the full 600,000 cubic feet discharge through the canal. The taking of water from Lake Michigan, however, for drainage purposes (or rather for dilution of sewage) has not yet been authorized by Congress. This deep channel abruptly terminates at Lockport, and it is proposed to discharge the water through controlling gates into a non-navigable tail race down the slope to and through the City of Joliet into the lower Des Plaines and Illinois rivers. Any navigable channel, therefore, constructed in continuation of the drainage canal must connect with this canal at Lockport and terminate at or above LaSalle, about 66 miles distant, but the lockage after the opening of the drainage canal will be reduced by at least the amount that the increased discharge will raise the water surface of the Illinois River at LaSalle, increased by the slope in the drainage canal from Lake Michigan to Lockport, or, say, at least 12 feet when the drainage canal is actually discharging. This will result in reducing the number of locks required in any
2205 of the proposed schemes by one, but will substitute an obstruction due to the current in the canal and river, repeated in each pool of the river, if the natural channel be improved.

* * *

The trustees of the Chicago sanitary district are constructing their canal with fixed bridges with 22 feet clear

headroom over the canal. This is ample headroom for a commercial barge canal of the largest capacity, and the difference in cost between fixed and drawbridges crossing the canal between Chicago and Lake Joliet, with a reasonable allowance for difference in cost of operation, is probably sufficient to construct the canal from the present terminus of the drainage canal to Lake Joliet of from 8 to 10 feet depth, with locks suitable for the passage of the largest Mississippi River barges. Mississippi River towboats could then carry their tows to Lake Joliet, then transfer them to more handy tugs for passage through the more obstructive canal portion of the route. For an 8-foot channel from Lockport to Lake Joliet the estimated cost in 1890, exclusive of bridges, was $3,900,000. Swing bridges from Chicago to Lake Joliet were estimated at $3,653,000. The cost of operating the swing bridges would far exceed the cost of operating the locks without any corresponding advantages for a commercial canal, other than sentimental, over the part of the route where towing on the Mississippi River style cannot be applied.

Conclusion.

1. In my opinion the surveys already made are in sufficient detail for preliminary estimates of the cost of any suitable extension of the navigation of the Illinois River to Lake Michigan that does not involve enlargement of the Illinois and Michigan Canal from Joliet to LaSalle.

2. That prior to embarking in any such improvement it is advisable to secure from the State of Illinois the State works along the Illinois River and such parts of the Illinois and Michigan Canal as may be utilized; also to thoroughly complete the lower Illinois River improvement which has slowly progressed for thirty years, resulting in diversion of water traffic to rail.

3. That the dimensions and route of the proposed extension should be examined into and decided by a competent board of engineers, with means and authority to make such additional surveys as their proper enlightenment demands. The expenses and costs of such a board of the surveys are estimated at $30,000; if detailed plans, etc., are to be made, at $75,000.

2206 The locality embraces an important commercial route between the Great Lakes and the Mississippi River system, and its utility and worthiness has long been recognized by Congress.

Preliminary estimates of cost on various plans have been heretofore made, and reports containing them are referred to hereinbefore.

Very respectfully, your obedient servant,

W. L. MARSHALL,
Major, Corps of Engineers.

Brig. Gen. W. P. CRAIGHILL,
Chief of Engineers, U. S. A.

(Through the Division Engineer.)
(First indorsement.)
U. S. Engineer Office,
Northwest Division,

New York, February 20, 1897.

Respectfully forwarded to the Chief of Engineers, United States Army.

I am of the opinion that the upper Illinois and lower Des Plaines rivers are worthy of improvement with a view to extension of navigation from Illinois River to Lake Michigan at or near Chicago.

HENRY M. ROBERT,
Colonel, Corps of Engineers, Division Engineer."

On March 17, 1900, a Board of three Engineers appointed by the Secretary of War, under the Rivers & Harbors Act of March 3, 1899, made a report, which report is in part as follows. Chief of Engineers Report of 1900, Appendix MM., p. 3858. (Rec. Vol. IV, p. 2183.)

"*Extract from a Report of Board of Engineers March 17, 1900.*

Appendix MM of Report of Chief of Engineers 1900.
Page 3858.

Having considered the available facts bearing upon the questions presented, the Board has the honor to submit the following preliminary report, in compliance with Department letter of February 13, 1900.

2184 The instructions of the Board are found in the act of Congress approved March 3, 1899, as follows:

> 'The Secretary of War is directed to appoint a board of three engineers, which board shall make a survey and estimates of cost for the improvement of the Upper Illinois River and Lower Des Plaines River, in Illinois, with a view to the extension of navigation from the Illinois River to Lake Michigan at or near Chicago; said board of engineers shall report the estimates of cost for a channel seven feet deep, and also for a channel eight feet deep, throughout said proposed route; said survey and estimates of cost shall be made in pursuance of and according to the recommendations in report of January twenty-seventh, eighteen hundred and ninety-seven, and there is hereby appropriated for the expenses of said board and such survey the sum of thirty thousand dollars, or so much thereof as may be necessary.'

The report of January 27, 1897, is a 'Preliminary examination of Upper Illinois River and Lower Des Plaines River, Illinois, with a view to extension of navigation from Illinois River to Lake Michigan at or near Chicago,' made by Maj. W. L. Marshall, Corps of Engineers, U. S. A., and published in the report of Chief of Engineers, 1897, pages 2882-2887.

Detailed reports and surveys have also been submitted to Congress by the following officers:

Gen. J. H. Wilson, 1867, report published in House Ex. Doc. No. 16, Fortieth Congress, first session.

Col. J. N. Macomb, Corps of Engineers, Report of Chief of Engineers, 1875, Vol. II, page 525.

Maj. W. H. H. Benyaurd, Corps of Engineers, Report Chief of Engineers, 1884, page 1958.

Board of Engineers on Hennepin Canal and Illinois and Michigan Canal, Report of Chief of Engineers, 1887, page 2125.

Capt. W. L. Marshall, Corps of Engineers, Report of Chief of Engineers, 1890, page 2419.

The last report covers most thoroughly the entire subject, as far as it had then been developed, considers the various routes, shows the character and location of the works required on each, with detailed estimates of cost, and the 8-foot channel of those estimates is a water-way of so nearly the same dimensions as the 7 and 8-foot chan-

nels now called for that the work of the Board might be confined to the presentation of revised plans and estimates derived from this report, if it were not for the
2185 change in conditions which has resulted from the construction by the Sanitary District of Chicago of a drainage canal through the divide between Chicago and Lockport. This channel opens a waterway over this part of the route which more than meets the requirements of the one called for or of any other likely to be called for by those interested in navigation.

If the route by the Chicago River and drainage canal be adopted, there remains but little more than half of the work involved in the 8-foot project of 1890 for the Government now to take in hand in order to complete the improvement, since the estimated cost of this portion of the channel (about 28 miles) was nearly $14,000,000. By the Calumet and Sag route only about 10½ miles of the drainage canal can be utilized.

But while the drainage canal covers about half of the work involved in the project by way of Chicago River, it at the same time has turned an additional flow into the Des Plaines River, materially changing its low-water regimen. The requirement of this flow at present are 5,000 cubic feet per second, while the limit of 10,000 is probably more nearly the flow that will have to be dealt with, at least not long after the completion of the present project. As nearly as can now be estimated, this flow gives a water line indicated on the accompanying profile, and the contrast is shown with the low-water conditions hitherto existing. The steep slope shown on the profile indicates that with so large a volume of discharge the velocity of the current would be too great for up-stream navigation in an open river. This might be overcome to a great extent by canalizing the river by high dams, entailing great expenditures for the necessary works, as well as for the purchase of lands overflowed, the cost of which cannot even be approximated from present information."

November 17, 1900, the Board of Engineers made a report pursuant to the Rivers and Harbors Act of March 3, 1899, H. R., Document No. 112, 56th Congress, 2nd Session, Vol. 4, p. 2190. The report is in part as follows:

"The Board finds the most economic route for waterways of 7 feet and 8 feet depth to be from Utica to Marseilles in the bed of the river, 11.4 miles; thence around

the Marseilles rapids by canal, 7.4 miles; thence in the bed of the river to near the mouth of Kankakee River, 21.2 miles; thence by enlarging the Illinois and Michigan Canal to the Joliet basin, 18.3 miles; thence by canal through Joliet Basin and along the east bank of the Des Plaines River, 4½ miles, connecting with the Sanitary Canal at Lockport and thence through the Sanitary Canal
2191 and the Chicago River to Lake Michigan, thus complying with the terms of the Act of March 3rd, 1899. • • • •

2192 As in the preliminary report, the Board invites attention to the fact that the estimates are based upon the assumption that the State of Illinois and the sanitary
2193 trustees of the City of Chicago will cede the necessary parts of their respective franchises free of cost to the United States, both for construction and use.

The Sag Route

Since the Board's report of March 17, 1900, the trustees of the sanitary district have undertaken to cooperate with the United States in deepening the South Branch of Chicago river to 21 feet and widening it to at least 200 feet. They have already planned to substitute 7 bascule bridges for the center-pier bridges now obstructing the river. It is expected that this project will be extended, and that the City of Chicago will undertake a part of the bridge reconstruction and lower, or cause to be lowered, the three tunnels now limiting the navigable depth of the river to 17 feet. The fears entertained with respect to the dangers of navigating the South Branch of the river under the new conditions of reversed flow have been allayed to a great degree by the practical experience of the past season. For this reason, and because the plans for both the 7-foot and 8-foot waterways comply with the requirements of the act contained in the words "with a view to the extension of navigation from the Illinois river to Lake Michigan at or near Chicago" in connection with the Sanitary Canal, the Board is of the opinion that the additional cost will not justify the construction at the present time of an auxiliary canal from the Sanitary Canal to Lake Michigan by way of the Sag and Calumet Route, and is also of the opinion that such a route would not become a necessity until commerce of either 7-foot or 8-foot route should develop to a degree not expected for years."

Pursuant to the Rivers & Harbors Act of June 6, 1900, the Board of Engineers appointed under said Act, made a report dated November 18, 1900, in part as follows: (Vol. 4, p. 2197.)

"The project for the Lower Illinois river provides for locks 75 feet wide and 350 feet between miter sills with 7 feet on the miter sills at low water. The discharge
2198 of the Chicago Drainage Canal should increase the navigable depth to over 8 feet, and if the project be extended to Lake Michigan by the 8 foot project on which estimates have been submitted by the Board, there will be afforded a connecting link between the Great Lakes and the rivers of the Mississippi valley, not only ample for river navigation as it now exists, but also for any improvement therein that has been authorized by Congress.

But it is held by not a few that the United States should take the initiative and construct a great waterway of which the Illinois Valley line should be a link, extending lake navigation to the interior of the country, and that a commerce which does not now exist will then develop to such a magnitude as will more than justify the expenditures. For such a project a depth of 14 feet or greater will be required, and further surveys and estimates for a waterway of less depth than 14 feet cannot be considered by the terms of Section 22, under which the Board is instructed to act.

The engineering questions presented in a project for a deep waterway to connect Lake Michigan with the Illinois river, although attended with considerable difficulty, are by no means insuperable. The proposed line would embrace, first, the Chicago river, consisting of the main river and a portion of the South Branch for a distance of about 5 miles. This section is now under improvement by the United States in cooperation with the trustees of the Sanitary District of Chicago, and will, when the many changes in bridges and tunnels have been made, and the widening and deepening of the channel completed, afford a navigable depth of 21 feet and an available width of 200 feet.

Connecting with this section the sanitary canal affords a magnificent waterway, 28 miles in length, of sufficient depth and width for any possible requirement of navigation.

From the west end of this canal the waters of Lake Michigan, in a steady flow amounting to from 5,000 to 10,000 cubic feet per second, are discharged into the bed of the Des Plaines river, and are carried thence down through the Illinois to the Mississippi.

The velocity of current along the Des Plaines river, which would have resulted from confining this discharge to a channel of 8 feet depth for barge navigation, will be sufficiently reduced in a ship canal of 14 feet depth *or over to make up-stream navigation feasible.* On the lower Illinois river the prevailing slope of less than 0.15 foot
2199 per mile will insure so gentle a current that the depth required can be secured simply by enlarging the existing waterway by dredging in an alluvial deposit, at a cost which will be small when compared with the work which has been done by the City of Chicago in cutting through the divide between the Lake Basin and the Illinois Valley watershed,, so eloquently described in the memoir of the Board of Trustees of the Sanitary District of Chicago.

But such a channel to be of commercial value should either form a through line of communication between the lakes and the Gulf of Mexico or extend to some large center of population, as St. Louis. A waterway stopping at the Village of Grafton would have little commercial importance, except locally over one to the present terminus of the Drainage Canal at Lockport. The terminal arbitrary described by Mr. Cooley in his paper submitted will be as applicable in the one case as in the other.

The commercial possibilities of navigation by lake vessels to St. Louis and the Gulf of Mexico have been ably discussed in the papers accompanying this report, but all of these projects are based upon the assumption that the Mississippi river can be rendered navigable for such vessels. The feasibility of the development of the navigation of the Mississippi river is the essential element, which must first be determined before any project for extending lake navigation inland can be considered advisable."

Major Willard, U. S. Engineer at Chicago in 1901, pursuant to the Rivers and Harbors Act of July 3, 1896, made a report to the Chief of Engineers, which is found in the Chief of Engineers' Report 1901, p. 3006. (Rec. Vol. IV, p. 2187).

"The State laws authorizing the construction of the
2188 Sanitary Canal require removal of the state dams, when the flow required by the state law of 20,000 cubic feet per minute for each 100,000 inhabitants of the Sanitary District shall have become permanent, the expectation being that the increased discharge would furnish an open navigation equivalent to that pooled by the dams. The discharge of the sanitary canal, however, is regulated by the Secretary of War *insofar as it affects the interests of navigation in the Chicago River,* and has been reduced by his order to 200,000 cubic feet per minute until the South Branch shall have been widened and deepened sufficiently to permit the full flow required by the State law, or so much thereof as may be found safe."

In 1902 Col. O. H. Ernst, United States Engineer at Chicago, made a report to the Chief of Engineers, Report of Chief Engineers, 1902. App. K. K., p. 2097. (Rec. Vol. IV, p. 2200.)

"Since the flow of the Chicago River has been reversed through the South Branch by the discharge into the sanitary canal the slope has also been reversed from the lake upstream and the depth correspondently reduced. This loss in navigable depth will be more than restored in the main stream and in the South Branch by the excavations of the sanitary district, which, in order to facilitate the flow of the large volume of water required for the dilution of the sewage discharged into the drainage canal, has undertaken to enlarge these portions of the Chicago River to a width of 200 feet and central depth of 26 feet. These dimensions have no relation to the draft of vessels using the river, and if maintained as they should be for drainage purposes will furnish a navigable depth in excess of the requirements. The south fork of of the South Branch, and the North Fork, however, do not share in these benefits. In the South Fork particularly the dimensions of channel obtained by the operations of the Government were seriously impaired by the change of slope. The sanitary district has undertaken to restore these dimensions, and will no doubt do so, though it has been prevented from fully accomplishing the work by some difficult rock excavation. But it has not undertaken as yet to maintain them.

The Chicago River is the main sewer of Chicago, and as such is subject to deteriorating influences as a navigable channel from which there is no escape. The city ordinances against dumping solid matter into it are ample, and, I think, generally well observed. But a very large amount of solid matter must of necessity go into it with a perfectly legitimate use of it as a sewer. Periodical dredging will be necessary to maintain it as a navigable channel and, eventually, to maintain it even as a sewer. That work would seem to be as much the duty of the city as the maintenance of any other part of its sewer system. So far as the South Branch is concerned, the question has been solved by the necessities of the drainage canal, as already mentioned, but the sanitary district has not accepted responsibility for maintaining the other branches. Whether that organization or some other representing the people of Chicago should do the work is for them to decide, but it seems to me clear that the United States should not be called upon to do it. Accordingly, no estimate for maintaining the channel excavated under the project of 1896 is submitted."

In the Rivers and Harbors Act of June 13, 1902, an appropriation was made of $200,000 by Congress for the survey of a waterway 14 feet in depth from the terminus of the Sanitary District canal to St. Louis, Mo. The report of the commission was transmitted December 18, 1905, by Wm. Howard Taft, Secretary of War, said Document is known as H. R. Document 263, 59th Congress, 1st Session. (Rec. Vol. IV, pp. 2261-2269.)

In a letter from the Chief of Engineers to the Secretary of War, the Chief of Engineers said (Rec. Vol. IV, p. 2262):

"Washington, December 12, 1905.

Sir: The river and harbor act approved June 13, 1902, contained an item as follows:

The sum of two hundred thousand dollars, or so much thereof as may be necessary, is hereby appropriated for making such surveys, examinations, and investigations as may be required to determine the feasibility of, and to prepare and report plans and estimates of cost, of a navigable waterway fourteen feet in depth from Lockport, Illinois, by way of the Des Plaines and Illinois rivers to

the mouth of said Illinois River, and from the mouth of the Illinois River, by way of the Mississippi River, to Saint Louis, Missouri: *Provided*, That twenty-five thousaid dollars of said sum, or so much thereof as may be necessary, may be expended by the Mississippi River Commission in making surveys, examinations, and investigations herein required from the mouth of the Illinois River to Saint Louis *provided further* that the Secretary of War shall appoint a board of three engineers to make the surveys, examinations and investigations hereinbefore required from Lockport, Illinois, through the Des Plaines River and Illinois River, to the mouth of said Illinois River, and that all such surveys, examinations, and investigations shall be made to determine the feasibility of, and to prepare and report plans and estimates of cost of, a navigable waterway fourteen feet in depth from
2264 Lockport, Illinois, to Saint Louis, Missouri.

* * *

The Board estimates the cost of the channel from Lockport to Grafton at $23,543,582. This estimate is based on concrete locks 600 feet long, 80 feet wide, and 14 feet deep over the miter sills. The Board remarks that this depth while corresponding to the channel mentioned in the act, will not provide for any future increase, which may be made possible by argumenting the flow through the Chicago Drainage Canal above 10,000 cubic feet per second. The Board states that, to take full advantage of such possible increase in navigable depth, the locks would have to be entirely rebuilt, or would have to have increased depths given to them at the present time. To increase the depth over the miter sills 6 feet now would add about $1,376,000 to the cost of the project. The plan proposed is based upon the assumption that the abstraction of 10,000 cubic feet of water per second from Lake Michigan, a quantity contemplated in the State legislation affecting the drainage canal, will eventually be permitted by competent Federal authority.

In this connection the Board states that it does not condemn the present plan of taking 10,000 cubic feet per second, believing as it does that some such amount will be needed to protect the lives and health of the people of a great city and of a populous valley; but it invites attention to the fact that if a much larger amount be taken it will be necessary to construct remedial works elsewhere, and that these are, or should be, of an international character. It is led to make this remark by the attitude of the Illinois legislature and of the other principal advocates

of this enterprise, which is that the 14-foot waterway is only a beginning, and that a much deeper channel ulti-
2265 mately should be constructed, which means that a much larger volume of water must be taken from Lake Michigan. It is the opinion of the Board that the sanitary reasons for the abstraction of water so far exceed and overshadow the commercial reasons that the amount should be strictly limited by the sanitary necessities of the case. It is impossible to fix a limit to the future growth of Chicago. In a future not remote larger amounts of water may be needed for sanitary purposes, and channels deeper than 14 feet will then become practicable in the open alluvial portion of the Illinois River.

* * *

Very respectfully,

A. MACKENZIE,

Brig. Gen., Chief of Engineers, U. S. Army.

Hon. WM H. TAFT,

Secretary of War."

In the report of the Commission itself, it is stated, (Rec. Vol. IV, p. 2265):

"Extract from the Report of the Board, Page 9, Entitled Chicago Drainage Canal.

Besides being a highway of commerce, the Illinois and Michigan Canal has from the beginning served to carry off the sewage of Chicago. The Chicago River has always been the main receptacle of the sewage of the city, and as the volume of sewage has increased with the growth of the city additional facilities for discharging it into the canal have become necessary. When the canal was opened in 1848, a pumping plant was established at Bridgeport, where it joins the Chicago River. In 1860 the capacity of this plant was nearly doubled, being increased to about 400 cubic feet per second. Later on the summit level of the canal was cut down so as to provide a continuous gravity flow from the Chicago River and Lake Michigan. That work was completed in 1871 and the pumping plant abandoned. In 1883 a new pumping plant was brought into use, having a nominal capacity of 750 cubic feet per second, but it soon became evident that the discharging capacity of the old canal was quite inadequate to carrying the volume of water required to dilute

the sewage and that a new and greatly enlarged channel
2266 must be provided. The Chicago Drainage Canal was then constructed and was brought into use in January, 1900. It has not yet been completed to its full capacity as designed. When fully completed it will have a capacity of about 10,000 cubic feet per second, flowing at a low velocity. As now constructed, it has a depth of about 22 feet and a bottom width in different parts 110 feet, 160 feet and 202 feet, respectively. It constitutes a navigable channel able to accommodate the largest vessels now navigating the Great Lakes. It extends from the Chicago River to Lockport, where it discharges into the Des Plaines River and is now being extended 2 miles farther to a new power house. With the six miles of the Chicago River and the two miles extension just mentioned it provides a wide and deep channel for a distance of 36 miles from Lake Michigan. At present it has no navigable connection with the streams below, but under State legislation a connection is to be made. It creates an important water power.

Although the primary object of the Chicago Drainage Canal was the discharge of Chicago sewage, its function as a channel, for navigation, was kept in view from the beginning. All of the bridges over it are draw bridges with ample openings. The original act of the Illinois legislature providing for its construction dated May 29, 1889, contained the following item, viz:

> 24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the General Government shall improve the Des Plaines and Illinois Rivers for navigation, to connect with this channel, said General Government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes.

As its utility for sanitary or drainage purposes is dependent upon the supply of water which it may obtain from Lake Michigan, a matter wholly at the discretion of the Federal Government, the degree of control which the State offers to the United States in this act, although limited, is probably sufficient. It is conditioned, however, upon the improvement by the Federal Government of the Illinois and Des Plaines Rivers, and the degree

of improvement is described in Section 23 of the above mentioned State law, which contains the following language:

2267 If at any time the General Government shall improve the Des Plaines or Illinois Rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute, from such channel may cause to private property, so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter enlarge the entire channel leading into said Des Plaines or Illinois Rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet per minute, with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom.

The taking of large quantities of water from Lake Michigan for drainage purposes has not been authorized by Congress. It has been the policy of the War Department thus far to regulate the quantity of water which is admitted to the canal by the necessities of navigation in the Chicago River. The capacity of that stream at present is such that not more than about 4,200 cubic feet per second can pass without creating velocities which will unreasonably obstruct navigation. The quantity of water admitted to the canal is, for the present, limited to that amount, or, as expressed in the permit of the Secretary of War, to 250,000 cubic feet per minute. This is less than is required by the State law. It will no doubt be increased as the obstructions in the Chicago River are removed, and its discharging capacity increased, a work upon which the Sanitary District is now engaged. In repairing its estimates the Board has assumed that the full discharge of 10,000 cubic feet per second contemplated in the plans of the Sanitary District will eventually be permitted by the Secretary of War.

2268 VESTED RIGHTS.

The effect upon the level of Lake Michigan of withdrawing 10,000 cubic feet per second for an indefinite period has been the subject of an elaborate investigation under the office of the Lake Survey in Detroit, and the conclusion reached is that the final effect will be to lower the level about 6 inches. (See Annual Report of Chief of Engineers for 1900, p. 5401, and for 1902, p. 2779 and p. 2825; also for 1904, p. 4120.) Oscillations of more than 6 inches in the level of the lake's surface are very common, often occurring hourly for many hours in succession, while oscillations of 2 or 3 feet within an hour are not uncommon. Still greater oscillations within a year or series of years occur, all from natural causes. Moreover, during a severe winter the discharge of St. Clair River is reduced by ice less than one-third its normal discharge, the remaining two-thirds being stored up in Lakes Huron-Michigan and raising their levels; and the difference between the total discharge during a severe winter and the discharge during a mild winter will probably equal, or nearly equal, the discharge of the Chicago Drainage Canal for a year. A permanent average lowering of 6 inches in the lake's level, therefore, is not easily observed and will probably not be noticed by navigators. Nevertheless the effect is real and important. Evidently there is a limit to the amount of water which can be taken from the southern end of Lake Michigan without compensating works at the outlet of Lake Huron. The Board does not condemn the present plan of taking 10,000 cubic feet per second, believing as it does that some such amount will be needed to protect the lives and health of the people of a great city and of a populous valley; but it invites attention to the fact that if a much larger amount be taken it will be necessary to construct remedial works elsewhere, and that these are, or should be, of an international character. It is led to make this remark by the attitude of the Illinois legislature and of the other principal advocates of this enterprise, which is that the 14 foot waterway is only a beginning, and that a much deeper channel ultimately should be constructed, which means that a much larger volume of water must be taken from Lake Michigan. It is the opinion of the Board that the
2269 sanitary reasons for the abstraction of water so far exceed and overshadow the commercial reasons that the amount should be strictly limited by the sanitary necessities of the case. It is impossible to fix a limit to the fu-

ture growth of Chicago. In a future not remote larger amounts of water may be needed for sanitary purposes, and channels deeper than 14 feet will then become practicable in the open alluvial portion of the Illinois River."

On May 22, 1906, Lieut. Col. Bixby, Division Engineer at Chicago, made a report on the effect of the withdrawal of water from Lake Michigan by the Sanitary District at Chicago which report was transmitted to Congress as House Document 6, 56th Congress, 1st Session. (Rec. Vol. IV, p. 2397A.)

"Extract From a Special Report by Lt. Col. W. H. Bixby, U. S. Engineer, at Chicago, Entitled 'Effect of Withdrawal of Water from Lake Michigan by the Sanitary District of Chicago,' Dated May 22, 1906.

(H. R. Doc. 6, 59th Cong., 1st Sess.)

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Page 6.

Furthermore, by reason of winds and barometric effects, oscillations of 6 inches several times in a single day are frequent, and 2 to 4 feet within an hour are occasionally experienced. Consequently, individual exceptional levels are misleading, and the general effects of water diversions must be measured by annual average rather than by monthly or daily.

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Page 7.

In the few cases where past troubles from currents have been real, they have been due to the contracted channel ways at bridges, tunnels, and other special points,
2397B where full dimensions of water flow have already been secured or are being secured by the drainage district improvements, or will soon be provided by tunnel owners.

These troubles in the past have been quite freely and fully commented upon or reported upon by the boat interests and by this office, the most important of such reports being those of the hearing before the honorable Secretary of War, May 16, 1900 (E. D. 35242/7), that of Major Willard, February 16, 1901 (with third indorsement on E. D. 35242/26), that of Major Willard, June 20, 1900 (E. D. 35242/(?)), that of Major Willard, March 29, 1901 (with third indorsement on E. D. 35242/40), and that of Colonel Ernst, November 5, 1901 (which led to permit E. D. 35242/74, quoted above). These reports show that the greatest velocity heretofore actually observed at

any single point of the worst old bridge draw opening (that of Canal street, now greatly improved), was 2.24 miles per hour (3.29 feet per second), while the average for a whole cross section at this draw was only about 1.8 miles per hour (2.6 feet per second), and the average for a full 200-foot width of river just above and below the bridge would not have been over 1.2 miles per hour (1.8 feet per second); and that even a large part of this was probably due to sudden changes of lake levels for which the drainage district was not responsible. These currents, although much complained of at the time, are not greater than are constantly encountered in many tidal rivers on the Atlantic coast, where no complaints are made, because all boat captains and pilots are accustomed to such currents and make their arrangements accordingly.

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Page 8.

17. In the capacity of sewer to properly carry off all the diluted sewage which the sanitary district must dispose of in the future, the South Branch and West Fork of Chicago River and the district drainage canal will need the use of the full cross section now being given to them at their typical points of constriction, viz., 4,700 square feet in South Branch, Chicago River, where a future 8,000 cubic feet per second is now asked for; 5,200 square feet in West Fork, South Branch, Chicago River, 5,412 square feet in the earth sections and 3,542 square feet in the rock sections of the drainage canal, for all of which 10,000 cubic feet per second is now asked for; and 5,412 square feet in the lower (south) end of the drainage canal, where 14,000 cubic feet per second is now being asked for. I assume that after this volume of water reaches the
2397C Des Plaines and Illinois rivers it can be taken care of more easily than in the Chicago River and that the 2,800 square feet cross section of the proposed 14-foot waterway, now under consideration by Congress, will be supplemented sufficiently by the rest of the natural river on each side of the improved boat channel. The above cross-sections, so long as no boats lie at wharves or pass up and down the river, will allow the passage of the 8,000 cubic feet per second through the South Branch, with average velocities of not exceeding about 1.2 miles per hour (1.7 linear feet per second); 10,000 cubic feet through the West Fork, with average velocities of not exceeding about 1.3 miles per hour (1.9 linear feet per second), and the same flow through the earth sections of canal at not ex-

ceeding 1.2 miles per hour (1.8 linear feet per second), and through the rock section of canal at not exceeding 1.9 miles per hour (2.8 linear feet per second); and 14,000 cubic feet through the lower end of canal at not exceeding 1.8 miles per hour (2.6 linear feet per second).

Wherever the full free cross section of the river is obstructed by bridge abutments or by boats, either at docks or passing, the average 8,000 to 10,000 cubic feet per second water flow must pass through the reduced cross section at increased speed. The full development of this increase, while not instantaneous, will require only a few moments. In this manner, at bridges, the velocities will be increased for a short length by about 30 per cent; at places where two boats of 40 to 50 feet beam and 800 square feet wetted cross section are abreast the increase of velocity will be about 50 per cent; at places where three such boats are abreast the increase will be about 100 per cent; and in case four such boats should be abreast (one tied at the wharf on each side of the stream and two others trying to pass in mid-river), the increase will be about 200 per cent. The drainage currents in the South Fork, South Branch, due to the 2,000 cubic feet per second coming from the Thirty-ninth street pumping station, and in the North Branch, due to a similar pumpage probably soon to be established at some street near Evanston, in the north end of Chicago, will be only about one-half of those in the South Branch, and their effects will probably be so small as not to be complained of by navigation interests. The drainage currents in the canal prop-
2397D er between the West Fork and Lockport will be about the same as in the South Branch; but as this part of the canal was not originally a public waterway and has not yet been accepted as such by the Federal Government, it is doubtful whether the United States can object to any current which its owners may establish or desire to establish therein. It is therefore evident that so long as the Chicago River serves merely as a sewer and is not to be used by boats the drainage district currents will not be objectionable, but soon as it is also used as a harbor or as a canal or water route the currents begin to be seriously questionable.

* * *

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25. Summing up the above it may be briefly stated, therefore that 10,000 cubic feet per second diversion of water from Lake Michigan into the drainage canal will be, probably, not unreasonably obstructive to navigation and

injuries to property if divided up into 6,000 cubic feet per second through the main river and south branch, increased by 2,000 cubic feet per second more through the Thirty-ninth street sewer and 2,000 cubic feet per second more through Calumet River (10,000 cubic feet per second in all), but that an increase in these amounts to 8,000, 2,000, and 4,000 cubic feet, respectively (14,000 cubic feet per second in all), will probably prove to be unreasonably obstructive and injurious. Also that the 10,000 cubic feet per second will eventually and permanently lower the levels of Lakes Michigan and Huron by about 0.5 foot and Lake Erie by about 0.4 foot, and 14,000 cubic foot per second will make these depths 0.7 and 0.6 foot, respectively, which will be quite costly in future results."

On the fourth day of January, 1907, the International Waterways Commission made a report to the United States and to Canada which is as follows:

Senate Doc. 959, 62nd Congress, 3rd Session, p. 21. (Rec. Vol. IV, pp. 2409-2433.)

"Extract Entitled Appendix I Attached to the International Waterways Commission Progress Report Above Mentioned.
Page 67.

Report Upon the Chicago Drainage Canal by the Commission, January 4, 1907.

International Waterways Commission,
Toronto, Ontario, January 4, 1907.

The Honorable Secretary of War of the United States and the Honorable Minister of Public Works of Canada:

The International Waterways Commission has the honor to submit the following report upon the Chicago Drainage Canal:

1. The headwaters of the Illinois River, an important tributary of the Mississippi, approach within 10 miles of Lake Michigan near its southerly end, where stands Chicago. The river, called here the Des Plaines, is separated from the lake by a low and narrow divide running nearly north and south. In the divide are two depressions, about 8 miles apart, in which the height is only about 10

feet above the surface of the lake. The area eastward of the divide is drained by two streams, the Chicago and the Calumet Rivers, which empty into Lake Michigan.

The City of Chicago was originally built on the Chicago River, and, although it is now spreading into the Calumet region, it was for many years drained exclusively by the Chicago River, and its principal parts are now so drained. This river constitutes the main sewer of Chicago. The lake furnishes the city's water supply. To prevent the pollution of the water supply by sewage has always been the most important municipal problem with which Chicago has had to deal. Its solution has from a very early day been found in diverting a part of the river's flow into the valley of the Des Plaines through the most northerly of the two depressions mentioned above. The Illinois and Michigan canal, which was
2410 opened to navigation in 1848, was at once utilized for this purpose, and all subsequent improvements consisted in efforts to force more sewage through that canal until, in 1889, it was decided to build a new and greatly enlarged channel which should completely divert the Chicago River from Lake Michigan and draw from that lake a body of pure water large enough to make the sewage inoffensive to the communities by whose doors it must pass.

2. Before embarking upon this work the city in 1886 appointed a commission of three engineers 'to consider and report on any and all things which relate to the matter of water supply and drainage of the City of Chicago.' In January, 1887, the commission submitted a report to the mayor and city council of Chicago (copy appended marked 1), which it styled a preliminary report. It intended to submit an additional or final report in which the data upon which its conclusions were based should be given in greater detail, but such additional report was never submitted. After remarking that 'almost every conceivable way of dealing with these questions had been suggested and in some form applied during the past thirty years,' the commission stated that 'among the possible methods of getting rid of the Chicago sewage there are but three that have been deemed worthy of consideration, namely, a discharge into Lake Michigan, a disposal upon land, and a discharge into the main river.' It considered the first method too expensive, involving as it does a wide separation between the outlets of the sewers and the intakes of the water supply. It pronounced the second inapplicable to the metropolitan district as a whole, under the topographical conditions ex-

isting, but thought that it might be employed for the extreme northern and southern parts, the latter including the Calumet region. It recommended the third method. It was uncertain as to the quantity of water required to dilute the sewage so as to make it inoffensive, but in order to prepare an estimate of cost it was compelled to assume some approximate size of channel, and it did assume a size large enough to discharge 600,000 cubic feet per minute, that being the estimated amount of water falling upon the area tributary to the Canal during storms and not otherwise disposed of. It includes the drainage basis of the upper Des Plaines and of the Chicago rivers, but not that of the Calumet River. With a channel of less dimensions in times of storms and floods the Chicago
2411 River would not be fully diverted into the Des Plaines, but would back up into Lake Michigan. The result was a supply of 24,000 cubic feet per minute for each 100,000 people in a population of 2,500,000, the population which the commission thought it desirable to provide for, and the opinion was expressed that this would equal the maximum requirements.

3. Following this report the Illinois Legislature passed an act approved May 29, 1889, 'to create a sanitary district and to remove obstructions in the Des Plaines and Illinois Rivers,' of which the twenty-third and twenty-fourth paragraphs read as follows, viz:

'Paragraph 23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois Rivers, such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than 14 feet, and a current not exceeding 3 miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rock stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than 18 feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than 160 feet at the bottom capable of producing a depth of not less than 18 feet of water. If the population of the district draining into such channel shall at any time exceed 1,500,000, such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per min-

ute for each 100,000 of the population of such district, at a current of not more than 3 miles per hour, and if at any time the General Government shall improve the Des Plaines or Illinois Rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall, within one year thereafter, enlarge the entire channel leading into said Des
2412 Plaines or Illinois Rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute, with a current of not more than 3 miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water of not less than 18 feet throughout said channel, and shall have a width of not less than 160 feet at the bottom. In case a channel is constructed in the Des Plaines River, as contemplated in this section, it shall be carried down the slope between Lockport and Joliet to the pool, commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois Rivers wherever it shall be necessary so to do to prevent overflow or damage along said rivers, and shall remove the dams at Henry and Copperas Creek, in the Illinois River, before any water shall be turned into the said channel. And the canal commissioners, if they shall find at any time that an additional supply of water has been added to either of said rivers by any drainage district or districts, to maintain a depth of not less than 6 feet from any dam owned by the State to and into the first lock of the Illinois and Michigan Canal at La Salle, without the aid of any such dams, at low water, then it shall be the duty of said canal commissioners to cause such dam or dams to be removed. This act shall not be construed to authorize the injury or destruction of existing water-power rights.

'Paragraph 24. When such channel shall be completed and the water turned therein, to the amount of 300,000 cubic feet of water per minute, the same is hereby de-

clared a navigable stream, and whenever the General Government shall improve the Des Plaines and Illinois Rivers for navigation, to connect with this channel, said General Government shall have full control over the same for navigation purposes but not to interfere with its control for sanitary or drainage purposes.'

2413 By this act a flow of not less than 20,000 cubic feet per minute is required for each 100,000 inhabitants and provision is made for a population of 3,000,000. The evidence before the legislative committee which framed the bill as to the quantity required was contradictory. The amount fixed for dilution of the sewage was a minimum. (See Appendix I.)

4. Under this act the Sanitary District of Chicago was organized, embracing all of the city north of Eighty-seventh street and some 43 square miles of Cook County outside of the city limits. The total area of the district was 185 square miles and did not include the Calumet region nor the north shore. The trustees held their first meeting January 18, 1890. The Chicago Drainage Canal was then constructed, water being turned into it for the first time in January, 1900. It was not then, and has not since been, completed to its full capacity as designed. In some places where the excavation was in rock the full dimensions of the prism were taken out, but in earth a considerable volume was left to be removed by the easy method of dredging hereafter. When fully completed it was designed to have a capacity of 600,000 cubic feet per minute, or 10,000 cubic feet per second, flowing at a velocity of 1.25 miles per hour in earth and 1.9 miles per hours in rock.

5. The canal is 28.05 miles in length. For a distance of 7.8 miles from its junction with the Chicago River at Robey street its dimensions are 110 feet width at bottom, side slopes 1 on 2, depth of water 22 feet at low stage of Lake Michigan, with a grade of 1 in 40,000, the material being earth. This section is eventually to have a width of 200 feet at bottom.

6. For a farther distance of 5.3 miles, although the material is principally earth, the dimensions are 202 feet width at bottom, side slopes 1 on 2, minimum depth of water 22 feet, with a grade of 1 in 40,000. This section is completed.

7. For the remaining 15.95 miles the canal is excavated wholly or partially in rock. Where the natural rock does

not come to the surface walls of masonry have been built upon the rock surface, thus artificially carrying it to a height 5 feet above datum. The dimensions here are 160 feet width at bottom, 162 feet width at top, minimum depth of water 22 feet, with a grade of 1 in 20,000. This
2414 section also is completed.

8. The controlling works are situated near the town of Lockport at the western end of the canal. They consist of a bear-trap dam 160 feet wide, with a vertical play of 17 feet, and of seven sluice gates of the Stoney type, each 30 feet wide and having a vertical play of 20 feet. These works provide a very efficient means of controlling the flow of water through the canal.

9. The project of the sanitary district for the disposal of sewage by the canal when completed is briefly as follows: All sewers will discharge into the Chicago River, either directly or through intercepting sewers. From the mouth in Lake Michigan to the point where the North and South Branches unite the river will flow 8,000 cubic feet per second, less such quantity as may be pumped into the upper portion of the North Branch, which under the original project was 200 cubic feet per second admitted through a conduit at Fullerton avenue. From this point the combined flow will be 8,000 cubic feet to the point where the South Fork enters the South Branch, where it will be increased to 10,000 cubic feet by the water pumped from Lake Michigan at Thirty-ninth street and flowing through a large conduit in Thirty-ninth street to the South Fork. The volume which will finally enter the canal under this project will be 10,000 cubic feet per second.

10. The channel of the Chicago River is not large enough to transmit that volume from the lake to the canal except at velocities which are an obstruction to navigation. The amount which the Secretary of War has thus far permitted the sanitary district to pass through the river is 4,167 cubic feet per second. In order to obtain authority for a larger amount the trustees have undertaken to enlarge the channel of the river and have accomplished a large amount of work in that direction.

11. By act of the Illinois Legislature in 1903 the sanitary district was enlarged by annexing thereto the north shore district, containing 78.6 square miles, and the Calumet district, containing 94.48 square miles. The total area of the sanitary district is therefore now 358.08 square miles. The same legislature authorized the development of the water power created by the diversion.

12. The plans for the north shore region involve two additional conduits from the lake to the North Branch of the Chicago River, one at Lawrence avenue, into which 583 cubic feet per second, and one at Wilmette, into which 1,000 cubic feet per second, are to be pumped. As this water is to form a part of the 10,000 cubic feet originally to be taken out through that river, it does not add to the amount of water to be taken from Lake Michigan.

2415 13. The plans for the Calumet region involve a treatment of the Calumet River similar to that of the Chicago River. The river is to be diverted into the Des Plaines Valley. For this purpose a new channel is to be cut through the southerly depression in the divide, and to join the present drainage canal at Sag, about 11 miles from the controlling works at Lockport. From Sag to Lockport the drainage canal must carry the flow from the Calumet River in addition to that from the Chicago River. It was designed to accomodate the latter river alone, or 10,000 cubic feet per second, but improved methods of excavation, particularly channeling in rock, gave it a greater capacity than was computed; and the hydraulic formulae with which its dimensions were figured, being adapted to smaller streams, gave results which proved to be too large. It is found that the portion completed in rock, which includes the reach from Sag to Lockport, will carry an amount stated by the chief engineer to be 14,000 cubic feet per second. The difference, 4,000 cubic feet per second, is the amount which it is proposed to divert from the Calumet River. For this purpose it is proposed to excavate a channel having in earth a bottom width of 72 feet, with side slopes 3 on 5, and in rock a bottom width of 90 feet with vertical sides, the depth in both cases to be 25 feet.

14. Work in the territory annexed in 1903 has been limited to surveys, and the preparation of plans, and the expenditures in that territory have been small. The amount expended upon the drainge canal and accessory works, including the above, to December 31, 1905, is $40,873,629.71; in addition to which $1,556,226.56 has been expended for the development of water power and $7,290,101.27 has been paid out for interest. For a financial statement more in detail, see Appendix I.

15. Although the primary object of the Chicago Drainage Canal was the discharge of Chicago sewage, its function as a channel for navigation was kept in view from the beginning. All of the bridges over it are draw-

bridges with ample openings. A provision of this kind, as well as the care exercised to make the sewage inoffensive by liberal dilution, was necessary to conciliate the interests in the valley of the Des Plaines and Illinois River,
2416 which would otherwise be adversely affected. It can hardly be doubted that the canal will eventually form a part of an improved waterway between the Great Lakes and the Mississippi River, though its full depth will probably not be required for that purpose. Congress has not adopted any scheme for this improvement, but by its direction a survey was made, and plans with estimates for a waterway 14 feet deep were submitted, by a board of engineers in a report dated August 26, 1905. The board found that for a distance of about 100 miles from Chicago the improvement must be with locks and dams, and as the quantity of water required would be merely that needed for the service of locks and other incidentals, the extent of the improvement of depth which could be obtained in that part of the route was without limit so far as it depended upon the amount of water available. For the remaining distance, about 223 miles, the improvement would be an enlargement of the open channel and the degree to which it was practicable was entirely dependent upon the quantity of water flowing. The board assumed that the Chicago Drainage Canal would eventually be permitted to take 10,000 cubic feet per second from Lake Michigan ,and it expressed the opinion that with that volume added to the natural low-water discharge of the Illinois River a depth of 14 feet in the open channel could be maintained; also that if a much greater depth was to be secured a much larger volume of water must be taken from Lake Michigan.

16. In the neighborhood of Lockport the natural level of the ground falls away rapidly and excellent facilities are found for the development of water power. Under the state legislation of 1903 the sanitary district is now engaged in utilizing this incidental advantage of the drainage canal. The plans provide for an extension of the canal 10,700 feet between concrete walls and earth and rock embankments to the site selected for the power house and for the excavation of a tail race 6,800 feet long, 160 feet wide, and 22 feet deep. If the maximum quantity of water which the sanitary district now claims to be necessary for sanitary purposes—14,000 feet per second—be utilized it will be possible to develop about 40,000 electrical horsepower under a head of 34 feet. With 10,000 cubic feet per second about 28,000 horsepower can be

developed. A power house is being erected which will accomodate 8 turbines, each capable of generating 5,000 horsepower.

17. The sanitary district has acquired land on both sides of the canal throughout its length, the width of the strips varying from 200 to 800 feet. This land is offered to manufacturers at moderate prices, and it seems probable that they will in the course of time be attracted thereto, particularly after arrangements for furnishing them with cheap power from Lockport are completed.

18. The diversion of large bodies of water from Lake Michigan for supplying the drainage canal has not been authorized by Congres. The plans of the sanitary district, except those for the enlargement of the Chicago River, have not been submitted to any Federal authority for approval. It was only after the opening of the canal that application was made to the Secretary of War for permission to divert the quantity of water required by The State law. The secretary granted permission for such quantity as would pass through Chicago River without detriment to navigation, a quantity considerably less than that required by the State law. After experimenting with various amounts it was fixed at 250,000 cubic feet per minute, or 4,167 cubic feet per second, and that is the amount now authorized. It is 'subject to such modification as, in the opinion of the Secretary of War, the public interests may from time to time require.' Copies of all the permits granted by the Secretary of War in this connection will be found in Appendix I.

19. In the expenditure of $40,000,000 for the drainage canal the people of Chicago, with its population of 2,000,000 incurred a burden equivalent to that due to an expenditure of $1,600,000,000 by the United States, with its population of 80,000,000—that is, enough to build eight or more Panama canals. It was a very serious effort and has commanded the admiration and sympathy of all observers. The diversion of 10,000 cubic feet per second from Lake Michigan affects other interests adversely, but these interests have withheld their opposition, seeming to believe that some such amount was necessary, and apparently willing to contribute their share to protect the lives and health of the people of a great city. The plans calling for that amount have been under public discussion for some years. Although withholding formal approval, the Federal authorities have taken no steps to prevent their execution. Congress has called for a

plan and estimates for an improvement of the waterways connecting with it, the scope of which is fixed by that amount. There appears to be a tacit general agreement that Chicago needs or will need about 10,000 cubic feet of water per second for sanitary purposes and that the city should have it without further question.

20. It was not generally known until after the publication in March last of the report of the American section of this commission upon Niagara Falls that an amount greater than 10,00 cubic feet per second would be asked for. In that report, subsequently concurred in by the Canadian section, it was recommended that the diversion of 10,000 cubic feet be allowed. The preservation of Niagara Falls alone was considered, and that in the light of the tacit agreement above described. It was supposed at the time that this was all that Chicago needed, but the recommendation gave offense to the officials of the sanitary district, and the further demand then came out in the form of appeals to the committees of Congress and to the Secretary of State. It is necessary now to take up the question anew, and, after considering it in all its bearings, to reach some conclusion as to whether there should be a limit to the amount of water to be diverted at Chicago, and, if so, as to what that limit is.

21. That the abstraction of water from Lake Michigan has a tendency to lower the level of that lake and of all the waters to which it is tributary is self-evident; but the exact effect of abstracting a given amount can be ascertained only from prolonged observation of the natural outlets under the varying conditions to which they are subjected during a series of years. An elaborate investigation of this subject was made under the office of the United States Lake Survey in Detroit, the results of which were published in the annual reports of the Chief of Engineers for 1900, page 5401; for 1902, pages 2779 and 2825; and for 1904, page 4120. Further observations are needed to be made when the difference of the level between Lake Erie and Lake Huron is greater or less than when the existing observations were made, but the results obtained from the latter are believed to be reliable within one-tenth of a foot. The amounts by which the
2419 mean level, as derived from observations of the last 46 years of the various waters will be lowered by a discharge of 10,000 and also by 14,000 cubic feet per second are given in the following table:

Location	Water level lowered by diversion at Chicago of—	
	10,000 cubic feet per second. Foot.	14,000 cubic feet per second. Foot.
Lakes Huron and Michigan	0.52	0.70
Lake St. Clair	.45	.64
Lake Erie	.45	.64
Lake Ontario	.35	.49
St. Lawrence River at Rapids Plat	.40	.56

From this table it appears that all the waters, including Lakes Michigan and Huron, Lake St. Clair, Lake Erie, Lake Ontario, and the St. Lawrence River, besides the important connecting channels, the Detroit and St. Clair Rivers, will be lowered by amounts varying from 4¼ to 6¼ inches for 10,000 cubic feet and from 6 to 8½ inches for 14,000 cubic feet per second. The length of time required to produce this effect is about five years; about half of it will be produced at the end of 18 months. The above figures give the effect at average level; they are much more considerable during low-water periods.

22. Variations in the level of the lakes' surface, due to winds and to change of barometric pressure, are frequent and irregular and at times violent. Variations of more than 6 inches are very common, often occurring hourly for many hours in succession, while variations of 2 or 3 feet within an hour are not uncommon. Besides these irregular variations there is a regular annual variation due to the difference in rainfall, evaporation, and run-off, the water level being highest in midsummer and lowest in midwinter. The levels are affected also by the greater or less severity of the winter and the consequent greater or less decreases in the discharging capacity of the outlets by ice. In order to study the annual oscillatons it is necessary to eliminate the irregular oscillations, and
2420 that is accomplished by using the average levels for a month. Using the monthly mean levels it is found that the regular fluctuation in Lake Huron-Michigan usually does not exceed 2 feet in any one year, but in a long series of years there is a great difference in the height

to which high water will rise. The highest high water (monthly mean) recorded for that lake was in June, 1886, and the lowest high water in June, 1896, the difference between the two being over 3½ feet. The first is what navigators of the Great Lakes call a high-water year and the second a low-water year.

23. It is evident that the average level of the lake may be lowered considerably without the change becoming immediately apparent, and that fact has been used as an argument to prove that the lowering caused by the Chicago Drainage Canal is of no consequence to those interested in navigation. Since they can not see it they will not know it and will not feel it. The argument is fallacious. It is true that they cannot see it immediately, they will soon feel it and will know it through the most costly means of acquiring knowledge—the injury to their material interests. The oscillations will remain the same as before, but low water will fall lower and high water will rise less high. The average draft of vessels must be diminished by the amount that the average level is lowered unless the depth be restored by remedial works.

24. The most important lake traffic is now carried on in large freight carriers which are loaded down to the greatest draft that can be carried into the harbors or through the channels between the lakes. With the depth now available they are usually loaded to a draft of about 19 feet, but careful watch is kept on the stage of the waterways and advantage is taken of any temporary increase of stage to load the vessels deeper. In the modern vessel each inch of increased draft adds about 50 tons to the carrying capacity. To lower the water surface 6 inches is to reduce the capacity of the vessel about 300 tons. If the freight rate on iron ore be taken at 55 cents per ton, exclusive of the cost of loading and unloading, and the number of trips during the season at 22, there appears a loss of over $3,600 for the season for each vessel. The number of vessels navigating the Great Lakes which draw 19 feet or more is 417, and their tonnage is 1,541,414 tons, which is about three-quarters of the total tonnage of the
2421 Great Lakes. It is a conservative estimate that the loss to the navigation interests resulting from a reduction of 6 inches in the depth of the water is $1,500,000 per annum, which capitalized at 4 per cent, amounts to a loss of $37,500,000. With a greater reduction of depth the resulting loss would be proportionately greater. The number of deep draft vessels and the share of lake traffic which

they carry is increasing each year, while the lake traffic itself is increasing with mavelous rapidity. The total number of tons of freight which passed through Detroit River in 1905 was about 58,000,000, valued at about $615,000,000. The records for the year 1906, so far as they are made up, indicate that the number of tons which passed through the Detroit River in 1908 exceeded 65,000,000, valued at $690,000,000. The loss will be even greater in the future than it is now. It is quite certain that the loss will not pass unnoticed, and that the Governments will be compelled to restore the depth either by additional excavations or by regulating works.

25. Careful estimates have been made of the cost of deepening the channels between the lakes 1 foot. To deepen the Detroit River is estimated to cost $4,115,430. In Lake St. Clair the full depth of the lake is now utilized, and any lowering of its surface involves the excavation of an artificial channel entirely across the lake, a distance of 18 miles, of which it has been necessary heretofore to artificially deepen only one-third. To deepen the channel here and at certain shoal places in St. Clair River and at the foot of Lake Huron is estimated to cost $1,080,720. It results in replacing open lake navigation by canal navigation for a distance of 12 miles in Lake St. Clair, a decided disadvantage.

26. The data are not at hand for an accurate estimate of the cost of restoring the depths in the harbors of the Great Lakes, but an approximation may be reached from a consideration of the cost of improvement heretofore made. The depth to be gained being small, the cost will not vary largely, whether that gain be a few inches more or less. The United States has improved 35 harbors on Lake Michigan, Huron, Erie, and has expended thereon about $20,000,000, of which about one-quarter was for maintenance. The average increase of depth is 10 feet
2422 and the cost per foot of increase was therefore about $1,500,000, but as the cost of a small increase would be much greater per foot than an increase of 10 feet, and as several harbors on Lake Ontario are to be added, the cost per foot in this case would probably not be less than $2,000,000 for harbors in the United States. The Canadian Government has improved over 50 harbors on Georgian Bay, Lake Huron, St. Clair, Erie and Ontario. A large amount, say $3,000,000, must be added for increasing the depth of these harbors.

27. The depth in the Welland Canal and in the six canals employed to overcome rapids in the St. Lawrence River is now 14 feet, of which every inch is needed. At the head of the Cornwall Canal in the St. Lawrence River the abstraction of 14,000 cubic feet of water per second at Chicago will lower the surface about 6¾ inches at mean level and much more at low water. To restore the depth in these canals involves the reconstruction of all the end locks and deepening the approaches thereto, and is estimated to cost $2,500,000.

28. The total cost of restoring the depth in the harbors of the Great Lakes and the channels between the lakes is therefore roughly $10,000,000, and of restoring it in the Welland and St. Lawrence Canals is $2,500,000 additional, or $12,500,000 in all.

29. The shores of the Great Lakes are very far from being fully developed, and it is highly probable that many harbors not now in existence remain to be created, or if in existence remain to be improved. The lowering of the lakes' surface increase the difficulty and cost of such improvements. This consideration is of importance, although no money value can now be given it.

30. The expenditure of the sums mentioned above will restore the depths now existing, but it will not prevent very serious annoyance to the navigation interests during the execution of the work. The time required will be several years, and in the meantime the vast commerce of the Great Lakes will be hampered, not only by deficient depth, but also by the occupation of the channels, already crowded with commerce, by the excavating machines.

31. It is evident from the foregoing that large bodies of water cannot be diverted by the Chicago Drainage
2423 Canal without very serious detriment to the navigation interests of the Great Lakes and of the St. Lawrence Valley. The greater the amount of water diverted the greater the injury. Chicago being one of the principal lake ports. there will be very few communities which will feel this detriment more than she will.

32. In the presence of these interests, the effect upon Niagara Falls may be simply mentioned with a reference to our former reports on that subject. The volume of Niagara Falls will be reduced by the full amount diverted at Chicago.

33. The City of Chicago was organized as a city in 1837 with a population of about 4,000. Its population in 1840 was 4,479; in 1850, 28,269; in 1860, 112,172; in1870, 298,977; in 1880, 503,185; in 1890, 1,099,850; and in 1900 it was 1,698, 575. It is estimated now to be about 2,000, 000. Should the rate of growth continue which prevailed between 1880 and 1900, the population will be 3,000,000 in the year 1922, and 4,000,000 in the year 1939. It is impossible to foretell its future growth, but there is no reason to doubt that it will in time greatly exceed the largest of these numbers. The city is the commercial center of an empire still in its infancy. It is entirely reasonable to expect a population of five or six millions or more. It will cover territory not now covered. Methods of sewerage disposal appropriate to one portion of it may not be appropriate to other portions. If the diversion of 20,000 cubic feet per minute (or 333⅓ cubic feet per second) for each 100,000 of population, as required by the State law, is accepted as the standard, then from 17,000 to 20,000 cubic feet per second will be required, and the 14,000 cubic feet now contemplated will not be sufficient. Even more than 20,000 cubic feet will be required for a population greater than 6,000,000. The diversion of 20,000 cubic feet per second would lower Lakes Michigan and Huron about 13 inches and Lake Erie about 11 inches. Plans which lead to this result should be carefully scrutinized.

34. One of the reasons given in 1889 for adopting this method of disposing of Chicago sewage was that it offered the advantage of furnishing a navigable waterway from Chicago to the Mississippi River. The navigable depth or capacity of such a waterway has never been authoratively fixed. Congress has considered a depth of 14 feet to the extent of ordering a survey and estimates of cost for that depth, but the Illinois legislature has declared its policy to be to secure the construction of a deeper channel, not limiting its proposed capacity in
2424 terms, but defining it to be 'of the greatest practicable depth and usefulness for navigation.' See joint resolution adopted May 27, 1889, copy omitting preamble hereto appended, marked 'I_5.' A fair interpretation of this language gives a proposed depth of 20 feet, that being the depth required to accomodate the most important vessels now navigating the Great Lakes. It will require a volume of water greater than the 10,000 cubic feet per second originally contemplated.

35. The amount which it is proposed to divert from the Calumet River 4,000 cubic feet per second, is fixed by accident rather than by design, being the excess which the Chicago Drainage Canal is found capable of carrying after providing for the 10,000 cubic feet from the Chicago River, for which it was originally constructed. It is certain that no greater amount than 4,000 cubic feet can be diverted from the Calumet without checking the flow from the Chicago River, and thus giving relief to a suburban portion of the city at the expense of the richest and most populous centers.

36. It is equally certain that the diversion of 4,000 cubic feet or less will not at all times afford the desired relief to the Calumet. In the first place it provides for a population of only 1,200,000, a number which will in all probability be greatly exceeded at a day not remote. At present the population is estimated at about 200,000, but for the present necessities it is not a question of population, but of drainage area and rainfall. A flood discharge of the Calumet has been measured at Riverdale, about 10 miles from its mouth, of about 13,300 cubic feet per second from a drainage area of about 700 square miles, and even that amount may at times be exceeded. The total drainage area of the Calumet region, including the Sag Valley, is about 825 square miles, and assuming the discharge to increase in proportion to the area, the flood discharge to be provided for is over 15,700 cubic feet per second. The diversion of only 4,000 cubic feet will not prevent a heavy discharge into Lake Michigan in time of flood. To overcome this difficulty it is proposed, if suitable legislation can be secured, to divert the upper Calumet into Lake Michigan through an artificial channel to be excavated in Indiana about 17½ miles east of the
2425 State line. Indiana has not authorized such diversion, but supposing it to be accomplished, there will still be times when the discharge from the drainage area remaining to be cared for by the canal, 238 square miles, will exceed 4,000 cubic feet per second. The excess must enter Lake Michigan through the mouth of the Calumet, and at such times the system will fail. Of course it makes no provision for the future occupation of the upper Calumet region and the pollution of the lake from that source. It thus appears that the diversion of the Calumet River as now proposed by the Sanitary District will not be complete even for the present, and will not make adequate provision for the future.

37. The diversion of 4,000 cubic feet per second provides for a population of 1,200,000 by the standard fixed by the State law. The population of the Calumet region is now about 200,000, and until it reaches 1,200,000 only a part of the flow will be needed for sanitary purposes during a large part of the year; but the channel must be there, available for the full flow, if this method of sewage disposal is to be useful to any population, however small. Likewise the channel from the Chicago River must be, as it is, large enough to provide for a population of 3,000,000, whether that number of people are ever to become tributary to the Chicago River or not. The channels having once been constructed, any reduction of flow below their fullest capacity is a dead loss to the water power dependent upon them. It has been said that it would be absurd to develop water power at the cost per horsepower which this water power costs if the drainage canal be included, and that is true. But being given the channels, it would not be absurd to use them to their fullest capacity. The Chicago Drainage Canal having been constructed, with a capacity, as it turn out, of 14,000 cubic feet per second, full power development will call for the whole of that amount, and in fact power works are now under construction at Lockport to utilize it. Inasmuch as the sanitary requirements by the standard fixed in the State law are only 6,667 cubic feet per second for the present population of 2,000,000, it is evident that power development incidental though it be, does lead to demands for water not required for sanitary purposes.

38. It remains to be seen whether any diversion, complete or otherwise, is necessary to preserve the health of Chicago. Upon this point the commission sought the advice of two eminent sanitary engineers—Messrs. Rudolph Hering and George W. Fuller—whom it instructed as fol-
2426 lows, viz.: 'To examine the sanitary situation at Chicago, so far as it is affected by sewage disposal, and to report whether it is or is not necessary to the health of the city to extend to outlying territory the system which was adopted in 1889 for the main city. * * * The commission desires an emphatic opinion from authoritative sources as to whether the system of diverting the water of Lake Michigan in large quantities into the Illinois Valley is the only way to preserve the lives and health of the people of Chicago. It does not desire an investigation of the effect upon the navigation interests

of the Great Lakes. It has satisfied itself upon that point. Nor does it wish to reopen the case of the Chicago Drainage Canal as designed and built. It accepts that as a fixed fact, with its attendant diversion of 10,000 cubic feet per second through the Chicago River. The extension of the system to the Calumet River alone is in question, and the question is, Are there not other methods of sewage disposal which can be applied here at a cost not exceeding much, if at all, the cost of the method proposed, and which will be equally effective in preventing the pollution of the lake? It desires a report upon the various systems which may be found available for application here, with a statement of their relative efficiency. It also desires a statement of their relative cost, so far as that can be given without the preparation of detailed plans. The latest conclusions of sanitary engineers as to the amount of dilution which is required to make sewage inoffensive should be given.' These gentlemen visited Chicago, and after a thorough examination of the situation submitted a report, of which a copy is hereto appended, marked 'I.' The entire report should be carefully studied. Its conclusions only are here quoted. They are as follows, viz.:

'The latest conclusions of sanitary engineers as to the amount of dilution which is required to make sewage inoffensive are that a dilution of 3½ cubic feet per second for each 1,000 persons connected with the sewers, as provided for in the enactment of the Illinois legislature in 1889, is as low a figure as it is now possible to state. We believe that with the elimination of objectionable trade wastes and the occasional dredging of the river this amount of dilution will be sufficient to prevent offensiveness.

The extension of the dilution method to the outlying territory is not the only way to preserve the lives and
2427 health of the people of Chicago. The application of the method, with flow of 10,000 and 14,000 cubic feet per second, respectively, for the area tributary to the present drainage canal, will serve populations not exceeding 3,000,000 and 4,200,000, respectively. For greater populations other methods of sewage disposal will be required.

For the Calumet area, as well as other districts, there are several methods for the disposal of sewage as effective as the present method of dilution in preventing the pollution of the lake waters.

All these methods involve intersecting sewers and pumping stations to collect and deliver the sewage at suitable sites. Septic tanks are used for partially clarifying the sewage, which may then be applied to any one of three methods, of filters, viz.: intermittent sand filters, contact filters and sprinkling filters.

All of these filters if well built and well managed remove the suspended and organic matters so that the effluents are practically clear and non-putrescible. The removal of bacteria by these three types of filters average at least 98, 80 and 90 per cent., respectively. Such effluents may be discharged into any of the water courses of the Calumet region.

The approximate total costs, liberally estimated, without the preparation of detailed plans, for a population of 1,200,000 are as follows:

A—Intermittent Sand Filters.

Construction	$11,063,000
Annual cost of operation, $866,000, capitalized at 5%	17,320,000
	28,383,000

B—Contact Filters.

Construction	$11,787,500
Annual cost of operation, $551,000, capitalized at 5%	11,020,000
	22,807,500

C—Sprinkling Filters.

Construction	$ 9,257,500
Annual cost of operations, $419,000, capitalized at 5%	8,380,000
	17,637,500

2428 The present population on the Calumet area of the sanitary district being less than 200,000 would naturally require but a portion of the cost of estimated works and of their operation to be expended at the outset.

Of the available methods of disposing of the sewage of the Calumet area other than by dilution, the sprinkling

filter method, being the cheapest both in cost of construction and of operation and accomplishing an adequate degree of purification, is clearly the most advantageous one.'

These engineers stand in the front rank of their profession as sanitary experts. One of them, Mr. Hering, was chairman of the commission of 1887, whose report to the mayor and city council of Chicago was the foundation of the subsequent legislation and led to the construction of the drainage canal. The conclusions reached are those of friends of Chicago and not of her enemies or rivals.

39. A method of sewage disposal for the Calumet region is proposed which for a population of 1,200,000 is estimated to cost $17,637,500. For the present population of about 200,000 only a part of the expense need be incurred, and the works can be developed as the population increases. It can, when the necessity arises, be applied with a population much exceeding 1,200,000. The cost of diverting the Calumet River into the Chicago Drainage Canal is estimated at $12,000,000. The greater efficiency at present and in the future of the method now proposed would justify a considerable increase of cost, but in view of the fact that the entire expense of the diversion must be incurred at the outset, while by the new method the expenditures will be regulated by the growth of population, the difference in cost may be considered unimportant.

Summary.

40. The following is a summary of the more important facts recited in this report:

(a) Chicago obtains its water supply from Lake Michigan, and to avoid polluting it must either dispose of its sewage otherwise than in the lake or place its intakes for water at a great distance from the city.

(b) The topography of the country favors the discharge of the sewage into the Des Plaines River, a tributary of the Mississippi, through two depressions in the divide which separate that river from Lake Michigan.

(c) The slope on the lake side of the divide is drained
2429 by two streams—the Chicago River and the Calumet River—into which the sewers of the city empty. By a cut through the northerly depression the flow of the Chi-

cago River has been reversed and diverted into the Des Plaines River instead of into Lake Michigan, and by a cut through the southerly depression the same process can be applied to the Calumet River.

(d) To make this reversal effective the channels must be large enough to take all the water which falls upon the respective drainage areas during the most violent rainstorms. This amount is estimated at 10,000 cubic feet per second for the Chicago River and 15,700 cubic feet per second for the Calumet River.

(e) The City of Chicago was originally built upon tha Chicago River, and that stream now drains the richest and most populous part of the city. It is now spreading over the Calumet region.

(f) In 1889 the plan of diverting the Chicago River into the valley of the Des Plaines was definitely adopted, and the Chicago Drainage Canal was undertaken. It was designed to carry 10,000 cubic feet per second. Though not entirely completed, it has been in use since January, 1900. The amount expended upon the canal and accessory work is about $41,000,000.

(g) The Illinois law which authorized the canal required a flow of 333 cubic feet per second for each 100,000 of population in order to render the sewage inoffensive. This amount of dilution is probably not excessive. It is reasonable to expect a population in a future not remote of five or six millions or more, involving the diversion by this standard of some 20,000 cubic feet per second. The Chicago River with its 10,000 cubic feet provides for a population of 3,000,000. The present population of the city is about 2,000,000.

(h) It is now proposed to apply to the Calumet River a treatment similar to that applied to the Chicago River, viz.: to reverse its flow, so that instead of discharging into Lake Michigan it shall discharge into the Des Plaines, but for a part of the new route it must follow the drainage canal already excavated for the Chicago River.

(i) Although the Chicago Drainage Canal was designed to carry 10,000 cubic feet per second, it is found to have, in its completed rock portion, an actual capac-
2430 ity of 14,000 cubic feet. This additional capacity fixes the amount which it is proposed to divert from the Calumet at 4,000 cubic feet per second. Any greater amount

from the Calumet will overtax the drainage canal at the expense of the richest part of Chicago and for the benefit of a suburban part.

(k) The diversion of only 4,000 cubic feet will not be effective at all times, since a much greater amount must be diverted from the Calumet during heavy rainstorms if the lake is to be protected. Moreover, it provides for a population not exceeding 1,200,000, which number will probably be exceeded at a date not far distant.

(l) The large channels necessary to provide for the contingencies of rainstorms are capable of discharging a volume of water largely in excess of sanitary requirements during the greater part of the year, but the development of water power creates the demand that they be employed to their full capacity throughout the year.

(m) The diversion of large bodies of water from Lake Michigan for supplying the drainage canal has not been authorized by Congress, but there appears to be a tacit general agreement that no objection will be made to the diversion of 10,000 cubic feet per second, as originally planned.

(n) The diversion of 10,000 cubic feet per second will lower the levels of Lake Michigan-Huron, Lake St. Clair, Lake Erie, Lake Ontario, and the St. Lawrence River, besides the important connecting channels, the Detroit and St. Clair Rivers, by amounts varying from 4¼ to 6¼ inches for the different waters, and the diversion of 14,000 cubic feet will lower them from 6 to 8½ inches. The diversion of 20,000 cubic feet will lower Lake Michigan-Huron about 13 inches and Lake Erie about 11 inches.

(o) The lake traffic which passed through the Detroit River in 1905 was about 58,000,000 tons, valued at about $615,000,000. It is increasing annually with marvelous rapidity. The records for the year 1906, so far as they are made up, indicate that the number of tons which passed through the Detroit River in 1906 exceeded 65,000,000, valued at $690,000,000. The lowering of the water surface has a very injurious effect upon this traffic and upon that of the Welland and St. Lawrence Canals. Chicago being one of the principal lake ports, there will be very few communities which will feel the injury more than she will.

2431 (p) The cost of restoring the depth in the harbors of the Great Lakes and the channels between the lakes is estimated at $10,000,000, and of restoring it in the Welland and St. Lawrence Canals at $2,500,000. This expenditure would not prevent very serious annoyance to the navigation interests during the execution of the remedial works, which would occupy several years. In Lake St. Clair navigation of the open lake would be replaced by that of an artificial channel or canal with submerged banks.

(q) The extension to the Calumet region of the method of sewage disposal already applied to the Chicago River is not necessary to preserve the health of Chicago, there being other and better methods available for the Calumet region. The final cost of these methods is somewhat greater than that of the one proposed, but the works can be developed as the population increases, and only a part of their cost need be incurred at present, while their greater efficiency justifies the increase of final cost.

(r) The diversion of 10,000 cubic feet of water per second at Chicago will render practicable a waterway to the Mississippi River 14 feet deep. Any greater depth must be obtained by the abstraction of more water from Lake Michigan and at the expense of the navigation interests of the Great Lakes and of the St. Lawrence Valley.

(s) The effect upon Niagara Falls of diverting water at Chicago is of secondary importance when considering the health of a great city and the navigation interests of the Great Lakes and of the St. Lawrence Valley, but it is proper to note that the volume of the falls will be diminished by the full amount diverted at Chicago.

Recommendations.

41. The waters of Lake Michigan in the United States, the waters of Georgian Bay in Canada, and the waters of Lake Superior partly in the United States and partly in Canada all form sources of supply of the Great Lakes system, finding their way by St. Lawrence to the sea. All are interdependent and there can be no diversion from any of them without injury to the whole system. By Article XXVI of the treaty of 1871 it is provided that

2432 'navigation of the river St. Lawrence, ascending and descending from the forty-fifth parallel of north latitude, where it creases to form the boundary between the two countries, from, to, and into the sea, shall forever remain free and open for the purposes of commerce to the citizens of the United States, subject to any laws and regulations of Great Britain, or of the Dominion of Canada, not inconsistent with such privileges of free navigation.' It is desirable that in any treaty arrangement the waters of Lake Michigan, Georgian Bay, and all other waters forming part of the Great Lakes system should be declared to be 'forever free and open for the purposes of commerce' to the citizens of the United States and the subjects of His Britannic Majesty, subject to any laws and regulations of either country not inconsistent with such privilege of free navigation.

42. The preservation of the levels of the Great Lakes is imperative. The interest of navigation in these waters is paramount, subject only to the right of use for domestic purposes, in which term is included necessary sanitary purposes. In our report of November 15, 1906, upon the application of the Minnesota Canal & Power Co. to divert certain waters in Minnesota, we recommended, among other things 'that any treaty which may be entered into should define the uses to which international waters may be put by either country without the necessity of adjustment in each instance, and would respectfully suggest that such uses should be declared to be (a) uses for necessary domestic and sanitary purposes; (b) service of locks for navigation purposes; (c) the right to navigate.' It is our opinion that so far as international action is concerned a treaty provision of that kind is all that is required in this case. We accordingly renew our recommendation of November 15, 1906, just quoted.

43. A careful consideration of all the circumstances leads us to the conclusion that the diversion of 10,000 cubic feet per second through the Chicago River will, with proper treatment of the sewage from areas now sparsely occupied, provide for all the population which will ever be tributary to that river, and that the amount named will therefore suffice for the sanitary purposes of the city for all time. Incidentally it will provide for the largest navigable waterway from Lake Michigan to the Mississippi River which has been considered by Congress.

We therefore recommend that the Government of the United States prohibit the diversion of more than 10,000 cubic feet per second for the Chicago Drainage Canal.

All of which is respectfully submitted.

O. H. Ernst,
Brigadier General, U. S. Army, Retired,
Chairman American Section.

George Clinton,
E. E. Haskell,
Members American Section.

Geo. C. Gibbons,
Chairman Canadian Section.

W. F. King,
Louis Coste,
Members Canadian Section.

Attest:

W. Edward Wilson,
Secretary American Section.

Thomas Cote,
Secretary Canadian Section.

International Waterways Commission progress report, Senate Doc. 959, 62d Congress, 3d Session, pages 67-77."

April 25, 1906, the Canadian Section of the International Waterways Commission made report recommending the division of waters of the Niagara River at Niagara Falls, in which there was allotted to the Chicago Drainage Canal 10,000 second feet. (Rec. Vol. VIII, p. 159; This Narrative p. 104.)

May 3, 1906, the International Waterways Commission, signed by both the American and Canadian members, made a report with similar recommendations. (Vol. VIII, p. 160, this Narrative p. 104.)

On January 11, 1909, the United States made a treaty with Great Britain regarding the use of Canadian boundary waters, which is as follows (Rec. Vol. IV, p. 2561-2572):

"Treaty between the United Kingdom and the United States of America relating to Boundary Waters and

Questions arising along the Boundary between Canada and the United States, signed at Washington, January 11, 1909.*

Treaty relating to Boundary Waters and Questions arising along the Boundary between Canada and the United States, signed at Washington, January 11, 1909.

His Majesty the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor of India, and the United States of America, being equally desirous to prevent disputes re-
2562 garding the use of boundary waters and to settle all questions which are now pending between the United States and the Dominion of Canada involving the rights, obligations or interests of either in relation to the other or to the inhabitants of the other, along their common frontier, and to make provision for the adjustment and settlement of all such questions as may hereafter arise, have resolved to conclude a Treaty in furtherance of these ends, and for that purpose have appointed as their respective Plenipotentiaries:

His Britannic Majesty, the Right Honourable James Bryce, O. M., his Ambassador Extraordinary and Plenipotentiary at Washington; and

The President of the United States of America, Elihu Root, Secretary of State of the United States;

Who, after having communicated to one another their full powers, found in good and due form, have agreed upon the following Articles:

Preliminary Article

For the purposes of this Treaty boundary waters are defined as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but

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* Ratifications advised by the Senate ..... March 3, 1909
Ratified by the President ..... April 1, 1910
Ratified by Great Britain ..... March 31, 1910
Ratifications exchanged at Washington ..... May 5, 1910
Proclaimed ..... May 13, 1910

not including tributary waters which in their natural channels would flow into such lakes, rivers, and waterways, or waters flowing from such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary.

ARTICLE 1

The High Contracting Parties agree that the navigation of all navigable boundary waters shall forever continue free and open for the purposes of commerce to the inhabitants and to the ships, vessels, and boats of both countries equally, subject, however, to any laws and regulations of either country, within its own territory, not inconsistent with such privilege of free navigation, and applying equally and without discrimination to the inhabitants, ships, vessels, and boats of both countries.

It is further agreed that so long as this Treaty shall remain in force this same right of navigation shall extend
2563 to the waters of Lake Michigan, and to all canals connecting boundary waters and now existing or which may hereafter be constructed on either side of line. Either of the High Contracting Parties may adopt rules and regulations governing the use of such canals within its own territory, and may charge tolls for the use thereof; but all such rules and regulations and all tolls charged shall apply alike to the subjects or citizens of the High Contracting Parties and the ships, vessels, and boats of both of the High Contracting Parties, and they shall be placed on terms of equality in the use thereof.

ARTICLE 2

Each of the High Contracting Parties reserves to itself, or to the several State Governments on the one side and the Dominion or Provincial Governments on the other, as the case may be, subject to any Treaty provisions now existing with respect thereto, the exclusive jurisdiction and control over the use and diversion, whether temporary or permanent, of all waters on its own side of the line which in their natural channels would flow across the boundary or into boundary waters; but it is agreed that any interference with or diversion from their natural channel of such waters on either side of the boundary resulting in any injury on the other side of

the boundary, shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion or interference occurs; but this provision shall not apply to cases already existing or to cases expressly covered by special agreement between the parties hereto.

It is understood, however, that neither of the High Contracting Parties intends by the foregoing provision to surrender any right which it may have to object to any interference with or diversions of waters on the other side of the boundary the effect of which would be productive of material injury to the navigation interests on its own side of the boundary.

ARTICLE 3

It is agreed that, in addition to the uses, obstructions, and diversions heretofore permitted or hereafter provided for by special agreement between the Parties
2564 hereto, no further or other uses or obstructions or diversions, whether temporary or permament, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdiction and with the approval, as hereinafter provided, of a Joint Commission, to be known as the International Joint Commission.

The foregoing provisions are not intended to limit or interfere with the existing rights of the Government of the United States on the one side and the Government of the Dominion of Canada on the other, to undertake and carry on governmental works in boundary waters for the deepening of channels, the construction of breakwaters, the improvement of harbours, and other governmental works for the benefit of commerce and navigation, provided that such works are wholly on its own side of the line and do not materially affect the level or flow of the boundary waters on the other, nor are such provisions intended to interfere with the ordinary use of such waters for domestic and sanitary purposes.

ARTICLE 4

The High Contracting Parties agree that, except in cases provided for by special agreement between them,

they will not permit the construction or maintenance on their respective sides of the boundary of any remedial or protective works or any dams or other obstructions in waters flowing from boundary waters or in waters at a lower level than the boundary in rivers flowing across the boundary, the effect of which is to raise the natural level of waters on the other side of the boundary unless the construction or maintenance thereof is approved by the aforesaid International Joint Commission.

It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other.

ARTICLE 5

The High Contracting Parties agree that it is expedient to limit the diversion of waters from the Niagara River so that the level of lake Erie and the flow of the stream shall not be appreciably affected. It is the desire of both
2565 Parties to accomplish this object with the least possible injury to investments which have already been made in the construction of power plants on the United States' side of the river under grants of authority from the State of New York, and on the Canadian side of the river under licenses authorized by the Dominion of Canada and the Province of Ontario.

So long as this Treaty shall remain in force, no diversion of the waters of the Niagara River above the Falls from the natural course and stream thereof shall be permitted except for the purpose and to the extent hereinafter provided.

The United States may authorize and permit the diversion within the State of New York of the waters of the said river above the Falls of Niagara, for power purposes, not exceeding in the aggregate a daily diversion at the rate of 20,000 cubic feet of water per second.

The United Kingdom, by the Dominion of Canada, or the Province of Ontario, may authorize and permit the diversion within the Province of Ontario of the waters of said river above the Falls of Niagara for power purposes, not exceeding in the aggregate a daily diversion at the rate of 36,000 cubic feet of water per second.

The prohibitions of this Article shall not apply to the diversion of water for sanitary or domestic purposes, or for the service of canals for the purposes of navigation.

ARTICLE 6

The High Contracting Parties agree that the St. Mary and Milk Rivers and their Tributaries (in the State of Montana and the Provinces of Alberta and Saskatchewan) are to be treated as one stream for the purposes of irrigation and power, and the waters thereof shall be apportioned equally between the two countries, but in making such equal apportionment more than half may be taken from one river and less than half from the other by either country so as to afford a more beneficial use to each. It is further agreed that in the division of such waters during the irrigation season, between the 1st of April and 31st of October, inclusive, annually, the United States is entitled to a prior appropriation of 500 cubic feet per second of the waters of the Milk River, or so much of such amount as constitutes three-fourths of its natural flow, and that Canada is entitled to a prior appropriation of 500 cubic feet per second of the flow of St. Mary River, or so much of such amount as constitutes three-fourths of its natural flow.

The channel of the Milk River may in Canada be used
2566 at the convenience of the United States for the conveyance, while passing through Canadian territory, of waters diverted from the St. Mary River. The provisions of Article 2 of this Treaty shall apply to any injury resulting to property in Canada from the conveyance of such waters through the Milk River.

The measurement and apportionment of the water to be used by each country shall from time to time be made jointly by the properly constituted reclamation officers of the United States and the properly constituted irrigation officers of His Majesty under the direction of the International Joint Commission.

ARTICLE 7

The High Contracting Parties agree to establish and maintain an International Joint Commission of the United States and Canada composed of six Commissioners, three on the part of the United States appointed by the President thereof, and three on the part of the United Kingdom appointed by His Majesty on the recommendation of the Governor in Council of the Dominion of Canada.

ARTICLE 8

The International Joint Commission shall have jurisdiction over and shall pass upon all cases involving the use or obstruction or diversion of the waters with respect to which under Articles 3 and 4 of this Treaty the approval of this Commission is required, and in passing upon such cases the Commission shall be governed by the following rules and principles which are adopted by the High Contracting Parties for this purpose:—

The High Contracting Parties shall have, each on its own side of the boundary, equal and similar rights in the use of the waters hereinbefore defined as boundary waters.

The following order of precedence shall be observed among the various uses enumerated hereinafter for these waters, and no use shall be permitted which tends materially to conflict with or restrain any other use which is given preference over it in this order of precedence—

1. Uses for domestic and sanitary purposes;

2567 2. Uses for navigation, including the service of canals for the purposes of navigation:

3. Uses for power and for irrigation purposes.

The foregoing provisions shall not apply to or disturb any existing uses of boundary waters on either side of the boundary.

The requirement for an equal division may in the discretion of the Commission be suspended in cases of temporary diversions along boundary waters at points where such equal division can not be made advantageously on account of local conditions, and where such diversion does not diminish elsewhere the amount available for use on the other side.

The Commission in its discretion may make its approval in any case conditional upon the construction of remedial or protective works to compensate so far as possible for the particular use or diversion proposed, and in such cases may require that suitable and adequate provision, approved by the Commission, be made for the protection and indemnity against injury of any interests on either side of the boundary.

In cases involving the elevation of the natural level of waters on either side of the line as a result of the con-

struction or maintenance on the other side of remedial or protective works or dams or other obstructions in boundary waters or in waters flowing therefrom or in waters below the boundary in rivers flowing across the boundary, the Commission shall require, as a condition of its approval thereof, that suitable and adequate provision, approved by it, be made for the protection and indemnity of all interests on the other side of the line which may be injured thereby.

The majority of the Commissioners shall have power to render a decision. In case the Commission is evenly divided upon any question or matter presented to it for decision, separate reports shall be made by the Commissioners on each side to their own Government. The High Contracting Parties shall thereupon endeavor to agree upon an adjustment of the question or matter of difference, and if an agreement is reached between them, it shall be reduced to writing in the form of a Protocol, and shall be communicated to the Commissioners, who shall take such further proceedings as may be necessary to carry out such agreement.

Article 9

The High Contracting Parties further agree that any other questions or matters of difference arising between them involving the rights, obligations, or interests of
2568 either in relation to the other or to the inhabitants of the other, along the common frontier between the United States and the Dominion of Canada, shall be referred from time to time to the International Joint Commission for examination and report whenever either the Government of the United States or the Government of the Dominion of Canada shall request that such questions or matters of difference be so referred.

The International Joint Commission is authorized in each case so referred to examine into and report upon the facts and circumstances of the particular questions and matters referred, together with such conclusions and recommendations as may be appropriate, subject, however, to any restrictions or exceptions which may be imposed with respect thereto by the terms of the reference.

Such reports of the Commission shall not be regarded as decisions of the questions or matters so submitted either on the facts or the law and shall in no way have the character of an arbitral award.

The Commission shall make a joint report to both Governments in all cases in which all or a majority of the Commissioners agree, and in case of disagreement the minority may make a joint report to both Governments, or separate reports to their respective Governments.

In case the Commission is evenly divided upon any question or matter referred to it for report, separate reports shall be made by the Commissioners on each side to their own Government.

Article 10

Any questions or matters of difference arising between the High Contracting Parties involving the rights, obligations or interests of the United States or of the Dominion of Canada either in relation to each other or to their respective inhabitants, may be referred for decision to the International Joint Commission by the consent of the two Parties, it being understood that on the part of the United States any such action will be by and with the advice and consent of the Senate, and on the part of His Majesty's Government with the consent of the Governor-General in Council. In each case so referred, the said Commission is authorized to examine into and report upon the facts and circumstances of the particular questions and matters referred, together with such conclusions and recommendations as may be appropriate, subject, however, to any restrictions or exceptions which may be imposed with respect thereto by the terms of the reference.

A majority of the said Commissioners shall have power
2569 to render a decision or finding upon any of the questions or matters so referred.

If the said Commission is equally divided, or otherwise unable to render a decision or finding as to any questions or matters so referred, it shall be the duty of the Commissioners to make a joint report to both Governments, or separate reports to their respective Governments, showing the different conclusions arrived at with regard to the matters or questions so referred, which questions or matters shall thereupon be referred for decision by the High Contracting Parties to an Umpire chosen in accordance with the procedure prescribed in the fourth, fifth and sixth paragraphs of article 45 of The Hague Convention for the pacific settlement of international disputes, dated October 18, 1907. Such Um-

pire shall have power to render a final decision with respect to those matters and questions so referred on which the Commission failed to agree.

ARTICLE 11.

A duplicate original of all decisions rendered and joint reports made by the Commission shall be transmitted to and filed with the Secretary of State of the United States and the Governor-General of the Dominion of Canada, and to them shall be addressed all communications of the Commission.

ARTICLE 12.

The International Joint Commission shall meet and organize at Washington promptly after the members thereof are appointed and when organized the Commission may fix such times and places for its meetings as may be necessary, subject at all times to special call or direction by the two Governments. Each Commissioner, upon the first joint meeting of the Commission after his appointment, shall, before proceeding with the work of the Commission, make and subscribe a solemn declaration in writing that he will faithfully and impartially perform the duties imposed upon him under this Treaty, and such declaration shall be entered on the records of the proceedings of the Commission.

The United States and Canadian sections of the Com-
2570 mission may each appoint a Secretary, and these shall act as joint Secretaries of the Commission at its joint sessions, and the Commission may employ engineers and clerical assistants from time to time as it may deem advisable. The salaries and personal expenses of the Commission and of the Secretaries shall be paid by their respective Governments, and all reasonable and necessary joint expenses of the Commission, incurred by it, shall be paid in equal moieties by the High Contracting Parties.

The Commission shall have power to administer oaths to witnesses, and to take evidence on oath whenever deemed necessary in any proceeding, or inquiry, or matter within its jurisdiction under this Treaty, and all parties interested therein shall be given convenient opportunity to be heard, and the High Contracting Parties agree to adopt such legislation as may be appropriate and necessary to give the Commission the powers above

mentioned on each side of the boundary, and to provide for the issue of subpoenas and for compelling the attendance of witnesses in proceedings before the Commission. The Commission may adopt such rules of procedure as shall be in accordance with justice and equity, and may make such examination in person and through agents or employes as may be deemed advisable.

ARTICLE 13.

In all cases where special agreements between the High Contracting Parties hereto are referred to in the foregoing Articles, such agreements are understood and intended to include not only direct agreements between the High Contracting Parties, but also any mutual arrangement between the United States and the Dominion of Canada expressed by concurrent or reciprocal legislation on the part of Congress and the Parliament of the Dominion.

ARTICLE 14.

The present Treaty shall be ratified by His Britannic Majesty and by the President of the United States of America, by and with the advice and consent of the Senate thereof. The ratifications shall be exchanged at Washington as soon as possible, and the Treaty shall take effect on the date of the exchange of its ratifications. It shall remain in force for five years, dating from the day
2571 of exchange of ratifications, and thereafter until terminated by twelve months' written notice given by either High Contracting Party to the other.

In faith whereof the respective Plenipotentiaries have signed this Treaty in duplicate and have hereunto affixed their seals.

Done at Washington, the 11th day of January in the year of our Lord one thousand nine hundred and nine.

(L. S.) James Bryce
(L. S.) Elihu Root

The above Treaty was approved by the United States Senate on the 3rd March, 1909, with the following Resolutions:—

Resolved,—That the Senate advise and consent to the ratification of the Treaty between the United States and

Great Britain, providing for the settlement of international difference between the United States and Canada, signed on the 11th day of January, 1909.

Resolved further (*as a part of this ratification*),—That the United States approves this Treaty with the understanding that nothing in this Treaty shall be construed as affecting, or changing, any existing territorial, or riparian rights in the water, or rights of the owners of lands under water, on either side of the International Boundary at the rapids of the St. Mary's River at Sault Ste. Marie, in the use of the waters flowing over such lands, subject to the requirements of navigation in boundary waters and of navigation canals, and without prejudice to the existing right of the United States and Canada, each to use the waters of the St. Mary's River, within its own territory; and further, that nothing in this Treaty shall be construed to interfere with the drainage of wet, swamp, and overflowed lands into streams flowing into boundary waters, and that this interpretation will be mentioned in the ratification of this Treaty as conveying the true meaning of the Treaty, and will, in effect, form part of the Treaty.

Protocol of Exchange.

On proceeding to the exchange of the ratifications of the treaty signed at Washington on January 11, 1909, between Great Britain and the United States, relating to boundary waters and questions arising along the boundary between the United States and the Dominion of
2572 Canada, the undersigned plenipotentiaries, duly authorized thereto by their respective Governments, hereby declare that nothing in this treaty shall be construed as affecting, or changing, any existing territorial, or riparian rights in the water, or rights of the owners of lands under water, on either side of the international boundary at the rapids of the St. Mary's river at Sault Ste. Marie, in the use of the waters flowing over such lands, subject to the requirements of navigation in boundary waters and of navigation canals, and without prejudice to the existing right of the United States and Canada, each to use the waters of the St. Mary's river, within its own territory; and further, that nothing in this treaty shall be construed to interfere with the drainage of wet, swamp, and overflowed lands into streams flowing into boundary waters, and also that this declaration shall be deemed to

have equal force and effect as the treaty itself and to form an integral part thereof.

The exchange of ratifications then took place in the usual form.

In witness whereof they have signed the present Protocol of Exchange and have affixed their seals thereto.

Done at Washington this 5th day of May, one thousand nine hundred and ten.

James Bryce (SEAL)
Philander C. Knox (SEAL)

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*The British ratification of this further Instrument was deposited with the United States Government July 23, 1910."

Respectfully submitted,

Clyde L. Day
Wm. F. Barrett
Edmund D. Adcock

Attorneys for Appellant.

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No. 161

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

THE UNITED STATES OF AMERICA,
Appellee.

Appeal from the District Court of the United States, for the Northern District of Illinois, Eastern Division.

BRIEF AND ARGUMENT FOR APPELLANT

MR. CLYDE L. DAY,
MR. GEORGE F. BARRETT,
MR. LOUIS J. BEHAN,
MR. EDMUND D. ADCOCK,
ATTORNEYS FOR APPELLANT.

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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO, *Appellant*, vs. THE UNITED STATES OF AMERICA, *Appellee.*	Appeal from the District Court of the United States, for the Northern District of Illinois, Eastern Division.

BRIEF AND ARGUMENT FOR APPELLANT.

STATEMENT OF THE CASE.

MAY IT PLEASE THE COURT:*

Appellant, The Sanitary District of Chicago, is here on appeal from a decree of the District Court, enjoining appellant from abstracting any waters from Lake Michigan across the Continental Divide to the DesPlaines, Illinois and Mississippi Rivers, in excess of 4,167 cubic feet per second, or 250,000 cubic feet per minute. (Appellant's Narrative, p. 117.) The decree was entered on June 18, 1923, appeal was allowed and the injunction suspended pending the appeal, and

* Owing to the length of the record, upwards of five thousand pages, appellant has filed, (as an appendix hereto), a condensation wherein is stated narratively the pleadings and evidence conceived by appellant's counsel to be material to either party, and it is entitled "Appellant's Narrative Statement of Pleadings, Facts and Evidence". For amplification of the facts stated herein, we will refer to this condensation as "Appellant's Narrative". Beginning with July 1, 1924, appellant furnished appellee's counsel with galley proofs of said narrative statement as it was being prepared, the final proofs being delivered about August 23d last, with request that any inaccuracies in the narrative occurring to appellee's counsel, should be indicated. At the time of filing this brief, no objections have been made to appellant by appellee.

the record was filed herein within the required time. The decree holds unconstitutional Section 20 of the Act of May 29, 1889, in force July 1, 1889, of the State of Illinois under which the appellant was organized and exists (Appellant's Narrative, p. 71), in that it limits the withdrawal of water from Lake Michigan for sanitary purposes to less than half what is prescribed by Section 20 of said Act, namely 20,000 cubic feet per minute for each 100,000 of the population within the territorial limits of the Sanitary District—upwards of 3,000,000 people. Thus, when the decree was entered, appellant was required by the Illinois Act to abstract from Lake Michigan 600,000 cubic feet of water per minute or 10,000 per second.

The decree also held it within the power of the Secretary of War, under Section 10 (this Brief, p. 108) of the Rivers and Harbors Act of March 3, 1899, to regulate the action of the State of Illinois taken pursuant to its police power, and thus the interpretation of the commerce clause of the Constitution is involved in this appeal.

There were two suits—a bill of complaint filed on March 23, 1908, and a complaint filed October 6, 1913. The first action was consolidated with the second one. (Appellant's Narrative, p. 113.)

The suit instituted March 23, 1908, involved the abstraction or diversion of water through an adjunct to the main diversion canal (called the Sanitary and Ship Canal or Main Channel). This adjunct is called the Calumet Sag Channel, and at the time the suit was instituted construction work had just been commenced. It was laid out to extend from the Little Calumet River westerly to appellant's main channel. It was designed to reverse the Calumet River and furnish an outlet for the drainage and sewage of the extreme southern area of appellant, namely that portion of Chicago lying south of 87th street and other territory lying south of the limits of the City of Chicago. It involved no other of ap-

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NOTE: The volume of water mentioned as per minute or per second indicates the amount flowing past a given point each second or each minute.

pellant's diversion works. However, the complaint filed October 6, 1913, not only involved all diversions of the Sanitary District, including that through its Main Channel and the Chicago River, but also the diversion by means of the Calumet Sag Channel covered by the first suit instituted, so that it is unnecessary to further consider the bill of complaint filed March 23, 1908.

The complaint in the second suit merely set up the organization of appellant in 1889 under an Act of the Illinois General Assembly passed May 29, 1889; the fact that it was diverting more water from Lake Michigan than appellee claimed was authorized by the Secretary of War, that the diversion would lower the levels of all the Great Lakes (except Lake Superior) and their connecting waters, and would thereby prevent boats carrying the cargo that they might have carried without the diversion; that such diversion was therefore a material injury to navigation. The complaint prayed that the appellant be enjoined from abstracting from Lake Michigan by means of its various diversion works, any waters in excess of 4,167 cubic seconds feet, the amount which appellee alleged the Secretary of War, had limited the abstraction under Section 10 of the Rivers and Harbors Act of March 3, 1899. (Appellant's Narrative, p. 21.)

The complaint was filed by the authority of the Attorney General, under Section 12 of the Rivers and Harbors Act of March 3, 1899, providing that *structures erected* in violation of Sections 9 and 10 *might be removed* by injunction instituted by the Attorney General (this Brief p. 108). It will be noted that this suit does not seek the removal of a *structure*.

Appellant's answer denied any injury to commerce or to navigation, and that there was any limitation of withdrawal made by the Secretary of War. It set up that there was an overruling necessity for such diversion, and various affirmative facts of defense—among others, that Congress had authorized the diversion across the Continental Divide by the Act of March 2, 1827, providing for the construction of the Illi-

nois and Michigan Canal from the southern end of Lake Michigan to the Illinois River; and that appellee had invited and acquiesced in appellant's course and it was thus estopped to deny appellant's right. (Appellant's Narrative, p. 39, *et seq.*)

It is unnecessary to further describe the pleadings, as there is no question of pleading involved, and the various issues of fact will appear in the succeeding portion of the statement of the case.

NOTE: There is no dispute as to any facts in the record except concerning the theoretical effect of appellant's diversion upon the surfaces of the Great Lakes, except Lake Superior, and appellee's claimed damage to commerce upon the Great Lakes. On other subjects appellee offered no evidence.

DESCRIPTION OF APPELLANT'S SANITARY & SHIP CANAL AND OTHER SUPPLEMENTARY DIVERSION WORKS.

Appearing in appellant's narrative (opposite p. 187) is a map entitled "Sanitary District of Chicago Map, showing right of way in Cook, Du Page and Will Counties". The map shows the territorial limits of the Sanitary District, the location of its various works completed in the beginning of the year 1914 and others, then, in process of construction. The completed channels, intercepting sewers, etc., are shown by yellow lines; the works in process of construction by red lines; the portion of the map appearing in dark red represents the original territorial limits of the Sanitary District as it was organized and laid out in the year 1889. The portions of the map colored yellow show the additional territory annexed by later acts. The entire territory of appellant contained 386.2 square miles, with a population at the time the decree was entered in this case, of approximately 3,300,000 people.

Lake Michigan is the only water supply for Chicago and its environs.

The underlying feature of appellant's works, from a sanitary standpoint, is the diversion at all times from Lake Michigan, of all sewage and drainage, so that this water supply will not at any time be or become polluted by the filth of this great metropolitan drainage area. This necessitated principally the construction of a canal and adjuncts of such size as to at all times keep reversed and flowing away from Lake Michigan, the Chicago River, its south branch and west fork. This principal canal, known as the Sanitary & Ship Canal, extends from the West Fork of the South Branch of the Chicago River at or near Robey street, upwards of twenty-eight miles, to a point just north of Joliet, where it empties into the DesPlaines River. Movable dams are located at its southern terminus by which the flow through it and appellant's

other diversion works may be at all times controlled. Its constructed capacity in the rock section, which is the southern portion of the Canal, is 14,000 cubic seconds feet of water. (Appellant's Narrative, p. 295.) Section 23 of the Sanitary District Act, provided that it should have a capacity in the rock section of not less than 10,000 cubic seconds feet of water. (Appellant's Narrative, p. 72.) This was and is the maximum or flood run-off of the Chicago River Drainage Area. (Appellant's Narrative, pp. 278, 279, 189.) If the capacity of the Main Channel were less than 10,000 cubic seconds feet, the Chicago River would at times flow into Lake Michigan, polluting the water supply.

Section 23 of the Act further provided that the Canal should be not less than 18 feet in depth and that it should not have a current greater than three miles per hour, all in order to provide proper navigation facilities thereon. The Channel is in the rock section 160 feet wide and in the earth section upwards of 200 feet, with a depth of 26 feet at all points. (Appellant's Narrative, p. 180.) Construction of the Channel was begun in 1890 by the making of surveys, and in 1893 by actual excavation. It was completed in 1898 and opened January 17, 1900, and since that time has been continuously operated. (Appellant's Narrative, pp. 288, 293.)

The Chicago River proper is very short, and extends from Lake Michigan approximately one mile, to the junction of the North and South branches of the Chicago River. The South Branch extends for some miles in a south and southwesterly direction, to the junction of the West Fork and South Fork of the South Branch. It is some distance on the West Fork southwesterly to the junction with it of the northern terminus of the Sanitary & Ship Canal just described.

At the time the Sanitary & Ship Canal was constructed, the South Branch and its West Fork were narrow, shallow and tortuous, so that it was necessary for the appellant to enter upon, use, widen and deepen, under Section 17 of the Sanitary District Act (Appellant's Narrative, p. 394) the

channels of these rivers, in order that they should become a supply channel by which the waters of Lake Michigan could be withdrawn through them to the Sanitary & Ship Canal. (Appellant's Narrative, p. 294.)

Consequently, beginning with the year 1896, the Sanitary District deepened, widened and straightened the channels of the South Branch and West Fork so that they have a capacity of withdrawing through them from Lake Michigan, water to the extent of 10,000 cubic seconds feet without creating a current injurious to navigation. The appellant deepened the channels of these rivers from 17 feet to 26 feet throughout, and widened them at all points to 200 feet; replaced old center pier bridges with modern bascules, so that at the bridge sites a current injurious to navigation would not exist with the added water, and the bridge openings would be large enough to permit the easy passage of boats. (Appellant's Narrative, p. 394.) The work of deepening and widening the channels of these rivers and the construction of the bridges, was all done with the consent of the Secretary of War under the various Rivers and Harbors Acts existing at the time the work was done, and at a cost to appellant of upwards of $10,500,000. (Appellant's Narrative, p. 296.)

This river improvement work may be properly divided into two periods—the work done prior to the opening of the Sanitary & Ship Canal on January 17, 1900, and the work done after that date. In the first period it was only necessary to improve the channels of the rivers, the West Fork and South Branch, to provide for the initial operation of the Sanitary and Ship Canal, which would then require a flow through it of waters from Lake Michigan of only 300,000 cubic feet per minute, as the population of the Sanitary District then was only approximately one and a half million people, all as is provided by Section 20 of the Act under which appellant exists. (Appellant's Narrative, p. 294.)

The authority of the Secretary of War for the work of excavating, etc., in improving the channels of the West Fork and the South Branch of the Chicago River during the first

period, 1896 to January 17, 1900, was represented by various permits then issued for specific work done from time to time. His consent for the improvement of the channels of these rivers, made after 1900, is represented by two permits issued on July 11, 1900, describing the proposed comprehensive improvement in these channels in order to provide for the withdrawal of at least 10,000 seconds feet of water from Lake Michigan through these channels to the Sanitary & Ship Canal. The work described by these permits and in the applications therefor made by the Sanitary District, provide for the deepening of the channels of these rivers from 17 to 26 feet, and widening at all points to 200 feet, including the work of reconstructing bridges to suit this improvement. (Appellant's Narrative, p. 90, 91.) The channel of the Chicago River itself was deepened by the United States, as the deepening and widening of the channels of the West Fork and South Branch of the Chicago River progressed, as above described. (Appellant's Narrative, p. 185.)

May 8, 1899, the Secretary of War issued a permit authorizing appellant to open its Sanitary and Ship Canal. The amount of water to be withdrawn through it was limited only by two conditions material here: (1) if Congress should act and specifically legislate, then the permit was to be null and void; (2) the Secretary of War might limit the flow through the Chicago River in the event a current was created therein unreasonably obstructive to navigation on the Chicago River, the Chicago River being then only 17 feet deep and narrow, and having obstructive bridges across it. (Appellant's Narrative, p. 21.)

Prior to the deepening and widening of the channels of the Chicago River, its South Branch and the West Fork of the South Branch, under the permits of July 11, 1900, (Appellant's Narrative, p. 92) the Secretary of War issued orders to limit, solely because of the current in the channels of those rivers, the diversion from Lake Michigan, (finally, on December 5, 1901), to 4,167 seconds feet. (Appellant's Narrative, p. 24.) Thereafter the river was deepened to 26

feet at all points and widened to 200 feet, pursuant to said permits of July 11, 1900, and bridges necessary for the improved channels were constructed. The Secretary of War has since refused to remove this limitation, notwithstanding the completion of the improvements of the channels of the Chicago River, its South Branch and the West Fork of the South Branch, and it is upon the limitation of the Secretary of War of December 5, 1901, that this litigation is founded. (Appellant's Narrative, p. 28.)

The sewer system of Chicago was constructed so that most of the sewers emptied into the Chicago River, its North and South Branches, the West Fork and South Fork of the South Branch. Some, however, debouched their sewage directly into Lake Michigan. (Appellant's Narrative, p. 178.) Consequently, large intercepting sewers were constructed along the shore of Lake Michigan to pick up the sewers emptying directly into Lake Michigan and by large conduits to divert this sewage to the DesPlaines River by means of the Sanitary & Ship Canal. On the south side of the city, as is shown by the map above described (Appellant's Narrative opposite p. 187), the interceptors converged at 39th Street and the sewage is there pumped, together with a certain amount of lake water, through the 39th Street Conduit into the East Arm of the South Fork of the South Branch of the Chicago River, whereupon it finds its way through the South Fork to the West Fork, and thence into the Sanitary & Ship Canal. The maximum capacity of the 39th Street Conduit, including sewage, is 2,000 cubic feet per second. The intercepting sewers on the North Side converge at Lawrence Avenue Pumping Station, and the sewage is pumped, together with a certain amount of water from Lake Michigan for dilution purposes, to the North Branch of the Chicago River, whereupon it finds its way through the North Branch to the South Branch of the Chicago River, and thence by its West Fork to the Main Channel. The maximum capacity of the Lawrence Avenue Conduit and Pumping Station is 40,000 cubic feet of water per minute, including sewage. (Appellant's Narrative, p.

191.) The North and South Side Intercepting Sewer Systems with pumping stations described, were completed about the year 1907 and thereby with the operation of the Sanitary & Ship Canal practically all the sewage and drainage arising in the original limits of appellant, was diverted from the water supply through the Sanitary & Ship Canal to the DesPlaines and Illinois Rivers. (Appellant's Narrative, p. 203.)

To further complete this drainage system and thereby protect the water supply of the inhabitants of Chicago and its environs, on May 14, 1903, an Act was passed by the General Assembly of Illinois (Appellant's Narrative, p. 76) providing for the annexation of territory north of the City of Chicago covering what may be called the North Shore Suburbs, including Evanston, Wilmette, Kenilworth, Winnetka, Glencoe, Hubbard Woods and others. The Act also provided for the annexation of territory to the south of the southern limits of the Sanitary District, or 87th Street of the City of Chicago, which includes what is known as the Calumet District, extending east to the Indiana State line. Under this Act, appellant was authorized to construct adjuncts, canals and other works necessary to furnish an outlet for the drainage of the added territory, cut through and destroy that portion of the Illinois & Michigan Canal, which parallels the Sanitary & Ship Canal to the DesPlaines River at or near Joliet. What is known as the North Shore Channel, extending from the North Branch of the Chicago River at or near Lawrence Avenue in the City of Chicago north to the shore of Lake Michigan at Wilmette, just north of Evanston, was constructed and placed in operation in the year 1910. The capacity of this channel is 1,000 cubic feet per second, and water is taken through it from Lake Michigan to dilute the sewage of the North Shore Suburbs as well as to furnish additional dilution water for the sewage entering the North Branch at various points. (Appellant's Narrative, p. 183.)

In connection with the North Shore Channel, intercepting sewers were constructed to divert the sewage of the North Shore Suburbs. The North Branch of the Chicago River

was straightened, widened and deepened to carry the additional water, and also to provide a navigable waterway all the way from the North Branch's junction with the Chicago River and its South Branch North to Wilmette, where a lock is provided for boats to pass from the North Shore Channel to Lake Michigan. This improvement was all done with the consent of the Secretary of War. (Appellant's Narrative, p. 183.)

To provide an outlet for the sewage and drainage of the Calumet District, immediately after the passage of said Act of May 14, 1903, the appellant laid out a right of way for and entered upon the construction of the Calumet Sag Channel (Appellant's Narrative, p. 6.) When the first bill of complainant was filed, namely, March 23, 1908, work on this canal was stopped and was not resumed until after June 30, 1910, when The Sanitary District obtained, from the Secretary of War, a permit to reverse the flow of the Calumet and Little Calumet Rivers. The permit was subject to the condition that there should not be diverted from Lake Michigan, by means of said channel, water in addition to what the appellant had the right to divert through its main channel, the Chicago River and its branches. (Appellant's Narrative, p. 82.) This channel extends from the Little Calumet River at or near Blue Island, westerly to a point at or near Sag, Illinois, on the Sanitary and Ship Canal. The capacity of this channel as it is now constructed, is approximately 2,000 cubic feet per second. There have been constructed intercepting sewers converging at or near the easterly terminus of said channel to divert all the sewage of the Calumet District so that no sewage will flow into the Calumet River or its branches within the State of Illinois. This channel, completed in the year 1922, reverses at practically all times the flow of the Calumet and Little Calumet Rivers. (Appellant's Narrative, p. 188.)

The Calumet Sag Channel is upward of 18 feet deep and over 60 feet wide, and at certain points is wider to provide for boats meeting or passing one another. It is designed for

further widening to provide a maximum capacity of 4,000 cubic seconds feet. (Appellant's Narrative, p. 188.)

The Sanitary & Ship Canal is wide enough and deep enough and the current therein is proper to permit the largest boats navigating the Great Lakes to pass through it to its southern terminus. All bridges over this channel have been so constructed that they may be moved, raised or lifted to leave the channel entirely unobstructed for navigation. This includes highway as well as railroad bridges. The Calumet Sag Channel, the North Shore Channel and all other improvements in rivers made by appellant, have been constructed or made so that all boats navigating the Illinois & Michigan Canal may pass through such canals or rivers without hindrance. (Appellant's Narrative, p. 188.) All this is pursuant to and under the express direction of the statute under which appellant exists, and to carry out the second great purpose of appellant's diversion works.

The cost of constructing the Sanitary and Ship Canal to provide navigation facilities over what it would have cost had it been built merely for the diversion of drainage and sewage with the statutory amount of water from Lake Michigan for dilution purposes is many millions of dollars. (Appellant's Narrative, 392.)

Section 7 of the Act under which the Sanitary District exists (Appellant's Narrative, p. 69) provides for appellant's owning dock property and leasing same along its right of way, in order that manufacturing or other establishments might locate there on water transportation. There was also constructed by appellant at the southern terminus of its main channel, for navigation purposes, a lock of sufficient size to permit the passage of boats to and from the Sanitary & Ship Canal into the DesPlaines River. The DesPlaines River was deepened and widened to connect navigation on the Sanitary & Ship Canal with the upper basin of the Illinois & Michigan Canal. (Appellant's Narrative, p. 181.) The Illinois & Michigan Canal between its Upper Basin at Joliet and Chicago, has not been used for years and navigation from Joliet to

Chicago has been carried on over the Sanitary & Ship Canal. (Appellant's Narrative, p. 296.) At the southern terminus of the Sanitary & Ship Canal, sufficient property has been reserved and set aside by appellant as a site for a lock upon which one may be built large enough to permit the passage of any boats capable of navigating the Sanitary & Ship Canal from it to the DesPlaines River below. (Appellant's Narrative, p. 297.)

At the southern terminus of the Sanitary & Ship Canal, at or near Joliet, there is a drop between the surface elevation of water in the Canal and the surface elevation of the water in the DesPlaines River just below, of approximately 34 feet. In order to utilize the potential water power existing, the original act of May 29, 1889, under which the Sanitary District was organized and now exists, authorized, and the Act of May 14, 1903, more expressly authorized, appellant to install such machinery as was necessary to convert the water power energy there into electricity. It was also empowered to use such of it as was necessary for its various pumping works and to sell the same primarily to municipalities, parks and districts within appellant's limits. (Appellant's Narrative, p. 78.) Consequently, in the latter part of the year 1907, this hydro-electric plant was completed and placed in operation. No water, however, has ever been diverted from Lake Michigan for the development of water power, and only the water that has been diverted for sanitary and navigation purposes has been so used. (Appellant's Narrative, p. 181.)

The diversion works and drainage and sewage outlets above described of the appellant thus provide for the diversion of a total of 12,000 cubic feet per second from Lake Michigan, and when the Calumet Sag Channel is fully completed, an additional 2,000 cubic seconds feet may be diverted through it, making a total of 14,000 cubic seconds feet, the original constructed capacity of the rock section of the Sanitary & Ship Canal. This diversion is accomplished as follows: Six thousand two hundred fifty seconds feet is drawn from Lake

Michigan through the Chicago River proper, to the junction of its North and South Branches. It is there augmented by 1,750 seconds feet, 750 from the Lawrence Avenue Conduit and Pumping Station, and 1,000 from Lake Michigan by means of the North Shore Channel; 8,000 cubic seconds feet thus flows through the South Branch of the Chicago River, to its junction with the West Fork and South Fork. This amount is augmented there by the 2,000 seconds feet coming from the 39th Street Pumping Station and Conduit to the West Arm of the South Fork of the South Branch. From the junction of the South Fork of the South Branch and the West Fork of the South Branch, there flows through the West Fork to the Northern Terminus of the Sanitary & Ship Canal at Robey Street and the West Fork, and thence through the Sanitary & Ship Canal to Sag, Illinois, 10,000 cubic seconds feet. At this point the Calumet Sag Channel enters with its flow of 2,000 cubic seconds feet of water, to be increased later by an equal amount. Thence the water flows or will flow in the amounts mentioned to the Southern Terminus of the Canal at or near Joliet, where it enters the DesPlaines River, and proceeds on its way to the Gulf of Mexico. (Appellant's Narrative, p. 191.)

The total cost of all these diversion works is approximately $75,000,000, and in addition there was expended $5,000,000 in the hydro-electric development at the southern terminus of the Sanitary & Ship Canal. (Appellant's Narrative, p. 194.)

ACTION OF THE STATE AND FEDERAL GOVERNMENTS CONCERNING THE DIVERSION OF WATER FROM LAKE MICHIGAN AT CHICAGO.

Waterway from Lake Michigan to the Gulf of Mexico.

The diversion of water across the Continental Divide or that small elevation of land which within a few miles of Chicago represents the division between the Great Lakes Basin, and the Mississippi River Basin, has been the subject of action of the State and Federal Governments substantially since Illinois became a member of the Union in the year 1818. Since the very earliest discovery by Joliet and Marquette of the Illinois River Basin in 1673, and thereafter, a water route has existed from the lower end of Lake Michigan through the Chicago River, its South Branch and the West Fork of the South Branch, and from there through Mud Lake to the DesPlaines River and thence to the Illinois. (Appellant's Narrative, p. 400.) This water route was used by the early explorers. adventurers and fur traders until about the year 1830. (Appellant's Narrative, p. 400.)

The DesPlaines River, rising in the State of Wisconsin, flows south to within ten miles of Lake Michigan at Chicago, near the source of the West Fork of the South Branch, then it veers southwesterly to a point where it forms a junction with the Kankakee River, creating the Illinois River. (Appellant's Narrative, p. 407.)

In times of high water, and during a large portion of the year, water flowed across the Continental Divide from the DesPlaines to the West Fork of the South Branch of the Chicago River. Likewise water flowed from the West Fork of the South Branch of the Chicago River to the DesPlaines River. Boats in these high water times could pass from the West Fork of the South Branch to the DesPlaines River, and vice versa. (Appellant's Narrative, p. 408.) In times of low water, there existed a portage whereby boats passed to and fro along this water route.(Appellant's Narrative, p. 407.)

The water route was described in the early reports made by Secretary of War John C. Calhoun to Congress. (Appellant's Narrative, p. 407.) The Enabling Act to permit the Illinois Territory to organize as a state, was amended in 1818 to include a coast on Lake Michigan, being the port of Chicago and extending to the present boundary between Illinois and Wisconsin. This water route and its probable improvement and enlargement, was stated to be, by Mr. Pope, in submitting the amendment, the reason for the addition of the coast of Lake Michigan to the Illinois territory. (Appellant's Narrative, p. 405.) The water route was recognized in the Treaty of Peace made by Major General Anthony Wayne in 1795, known as the Treaty of Greenville, and in the Treaty of 1816 with the Ottawas. (Appellant's Narrative, p. 408.)

The necessity of enlarging and improving the waterway was emphasized by reason of the refusal of the Government of Great Britain to permit the citizens of the United States free navigation on the St. Lawrence River. This refusal first took form in Acts of Parliament of 1822 and 1824. It was the subject of diplomatic exchanges in those years, also in the year 1827. These negotiations continued, until the year 1854, when a Treaty was made with Great Britain which gave to the citizens merely the privilege, but not the right of free navigation on the St. Lawrence River. (Appellant's Narrative, p. 409.)

March 30, 1822, Congress passed an act entitled "An Act to authorize the State of Illinois to open a canal through the public lands to connect the Illinois River with Lake Michigan." A portion of said Act is as follows:

> "That the State of Illinois be, and is hereby authorized to survey and mark through the public lands of the United States, the route of the Canal connecting the Illinois River with the southern bend of Lake Michigan; and ninety feet of land on each side of said canal shall be forever reserved from any sale to be made by the United States." (3 U. S. Stat. at large 659. Appellant's Narrative, p. 410.)

By reason of the failure of the State within three years from its passage to perform certain conditions, the Act ceased to have force or effect. Thereafter the General Assembly of Illinois memorialized Congress, setting forth the necessity of the passage of another act looking to the establishment of a canal from Lake Michigan to the Illinois River. Among other things, the Memorial stated:

> "That the construction of a canal uniting the waters of Lake Michigan with the Illinois River, will form an important addition to the Great Connecting Links in the chain of internal navigation which will effectually secure the indissoluble union of the confederate members of this great and powerful Republic." (Appellant's Narrative, p. 411.)

On March 2, 1827, Congress passed another act which has remained in force from and after its passage, and it still exists unrepealed, entitled "An Act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan." Said Act, among other things, provided:

> "That there be and hereby is granted to the State of Illinois, for the purpose of aiding the said State in opening a canal to unite the waters of the Illinois River with those of Lake Michigan, a quantity of land equal to one-half of five sections in width, on each side of said canal, and reserving each alternate section to the United States, to be selected by the Commissioner of the Land Office, under the direction of the President of the United States, from one end of the said canal to the other; and the said land shall be subject to the disposal of the Legislature of the said State, for the purpose aforesaid, and no other; provided, that the said canal when completed shall be and forever remain a public highway for the use of the Government of the United States, free from any toll, or other charge, whatever, for any property of the United States, or persons in their service passing through same; * * *" (4 U. S. Stat. at large 234. Appellant's Narrative, p. 412.)

January 9, 1836, the General Assembly of Illinois passed an act under which the Illinois and Michigan Canal was con-

structed. Section 16 of this Act prescribed the initial width to be not less than 45 feet, and fixed its depth, and

> "to be supplied with water from Lake Michigan and such other sources as the Canal Commissioners may think proper".

The Act reserved 90 feet on each side of the canal to enlarge its capacity whenever the public good should require. (Appellant's Narrative, p. 412.)

The original plan of the canal provided for its construction from Chicago to Joliet in such way that water should be taken through it from the West Fork of the South Branch of the Chicago River and from Lake Michigan by gravity. However, lack of funds prevented its completion on this plan, known as the Deep Cut Plan, and it was completed in 1848 upon the Shallow Cut Plan, whereby water was obtained for its operation from the West Fork of the South Branch of the Chicago River by means of pumps at its Northern Terminus, and by a feeder extending from the canal at Sag, Illinois, to the Little Calumet River, substantially on the site of the present Calumet Sag Channel of appellant above described. (Appellant's Narrative, p. 413.)

For the purpose of further enlarging the Canal and to provide greater depths of water in the Illinois River below the Canal's Southern Terminus, the General Assembly of Illinois in 1861 directed that a survey be made of the Illinois River and Illinois and Michigan Canal, portions of the Des Plaines and Chicago Rivers

> "of the different methods proposed or desirable for improving the navigation of the Illinois River, by dredging or excavation of the channel and wing dams, or by supplying water from Lake Michigan, through the enlargement and deepening of the Illinois and Michigan Canal, or otherwise, or by opening a channel from Lake Michigan by way of the South Branch of the Chicago River and Mud Lake to the DesPlaines River and down said Canal to a point that would secure a free, flowing, ample and never failing supply of water, sufficient for navigation of the Illinois River at all seasons and times, * * * and to include also an estimate for the channel herein-

before mentioned, of sufficient size to admit of full and free steam-boat navigation from the Illinois River to Chicago and Lake Michigan, as well as a size sufficient for supplying water for all the deficiencies of navigation in the Illinois River, at all seasons. * * *" (Appellant's Narrative, p. 415.)

February 12, 1867, pursuant to the Act of Congress of June 23, 1866, Major General Wilson reported to the Chief of Engineers upon a survey for the improvement of this waterway along the lines of the resolution of the General Assembly of Illinois of 1861, above mentioned. Among other things, the report stated:

"The Illinois River seems to have been especially designed by nature as the link by which the waters of Lake Michigan are to be connected with those of the Mississippi. * * * the data herein contained, together with the existence of a canal of limited capacity already in operation, demonstrate beyond a doubt that the waters of the Lake may be carried into the Illinois River through a navigable channel of any required dimensions, and at a cost which cannot be regarded as excessive when the objects to be obtained are duly considered. * * * The summit will be inexhaustible, and this cannot be said of any other practicable line of water communication between Lake Michigan and the Mississippi River." (Appellant's Narrative, p. 418.)

January 9, 1875, Major F. C. Doran reported upon a survey of this waterway to the Chief of Engineers, U. S. Army, in which, among other things, it was stated:

"The improvement of the eastern portion of the Illinois and Michigan Canal involves the further cutting down of the summit level and enlarging the waterway so as to afford an unfailing supply of water from Lake Michigan for the improved Illinois River." (Appellant's Narrative, p. 419.)

This canal (summit level) had just then been (1871) deepened to conform to the deep cut plan.

Under the Rivers and Harbors Act of March 3, 1879, Major Lydecker made a report to the Chief of Engineers, which was transmitted to Congress, concerning a survey for the

improvement of this waterway. The report made May 18, 1880, reviewed the history of the development of this waterway, and reports heretofore mentioned as to improvements, and further stated:

> "* * * It seems only necessary to note that the improvement of the Illinois River, supplemented by the enlargement of the Illinois and Michigan Canal, as heretofore proposed, will furnish a reliable and commodious channel of water communication from the Mississippi River to the Northwestern Lakes; by this means the vast Mississippi Valley, and all the country tributary thereto, is brought into direct water communication with Lake Michigan, at the Great City of Chicago, with its flood of commerce eastward and westward. The route exists as a practicable one of considerable importance today, and the question is simply one of enhancing its value by increasing its capacity to a degree commensurate with the important interests involved. * * * Considering this simple statement, the facts so fully set forth in previous elaborate reports, and knowing the wonderfully rapid development of the entire western country, it would seem that nothing further is necessary to indicate 'to what extent the general commerce of the country will be promoted' by the contemplated improvement, nor to show how desirable it is that the work should be accomplished with the least delay practicable." (Appellant's Narrative, p. 421.)

Pursuant to the Rivers and Harbors Act of August 2, 1882, Major W. H. H. Benyaurd made two reports, one dated September 2, 1882, and the other March 5, 1884. In the latter report, it was stated:

> "that with the improvement of the River now in question carried on, navigation will be brought to within thirty-three miles of the Lake, and this stretch can be opened by improving the DesPlaines higher up and by enlarging the present Illinois and Michigan Canal".

(Appellant's Narrative, p. 444.)

By the Rivers and Harbors Act of August 5, 1886, Congress provided for a survey of this water route and the improvement thereof which was made by Major Handbury in 1887, and the report of said survey among other things stated:

> "The United States and the State of Illinois have long been committed to the project of opening a water com-

munication between the Mississippi River and the Northern Lakes of capacity sufficient for the wants of commerce and for the exigencies of our national defense, should these ever arise. * * * Besides the immense commercial advantages that may be expected from the completion of the project, there are military and naval exigencies that might easily arise where it would figure as a prominent factor in the problem of our national defenses. From whatever point we look at the subject, there is nothing local or sectional in it. It is true that all the work to be done happens to be in the State of Illinois. The benefits to be derived belong to the nation at large. It is fortunate, too, that at this time the subject is unencumbered by any phase of a political character. The problem of connecting Lake Michigan with the Mississippi River by a commodious waterway that could be used for commercial, military and naval purposes, has received attention from our most thoughtful statesmen from the day of Albert Gallatin to the present." (Appellant's Narrative, p. 445.)

On May 28, 1889, the General Assembly of Illinois adopted a resolution expressing the waterway policy of the State, and asking cooperation of the Federal Government:

"Whereas, it is contemplated to increase the volume from Lake Michigan to 300,000 cubic feet per minute within a few years, and ultimately to add 600,000 cubic feet or more, thus enabling a large depth for navigation to be obtained by an improved channel, and that said channel will be self-sustaining and self-improving, and will discharge flood waters more readily, thus benefitting the bordering lands and increasing the healthfulness of the valleys;

"Whereas, works now projected by the City of Chicago will form part of a waterway of large proportions from Lake Michigan via the DesPlaines and Illinois Rivers to the Mississippi River; * * *

"Therefore, be it resolved * * *

(1) That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practicable depth and usefulness for navigation from Lake Michigan via the DesPlaines and Illinois Rivers to the Mississippi River, and to encourage the construction of feeders thereto of like proportions and usefulness. * * *

* * *

(3) That the United States is requested to aid in the construction of a channel not less than 160 feet wide and 22 feet deep, with such a grade as to give a velocity of three miles per hour from Lake Michigan at Chicago to Lake Joliet, a pool of the DesPlaines River, immediately below Joliet, and to project a channel of similar capacity and not less than fourteen feet deep from Lake Joliet to LaSalle, all to be designed in such manner as to permit future development to a greater capacity". (Appellant's Narrative, p. 448.)

The above resolution was adopted the day before the act, under which appellant was organized and exists, was passed by the General Assembly of Illinois. This act provided for three uses of the diversion: (1) Sanitary—to prevent the water supply of Chicago and its environs from being polluted by sewage or drainage; (2) Navigation—the diversion channels and canals to be constructed of such size and depth as to provide easy transportation for boats engaged in commerce, state and interstate, greater depths in the DesPlaines and Illinois Rivers for navigation, removal of all dams in the Illinois River to provide a free passage for boats; (3) Incidental to the two principal uses, development of water power and use of right of way along diversion channels or canals for docks, thus providing an inner harbor for navigation.

We will now trace and describe the things done by Illinois and the City of Chicago to the date of the passage of the act under which appellant was organized and now exists—May 29, 1889—in the diversion of waters of Lake Michigan through the Illinois and Michigan Canal for sanitary purposes.

In 1863 an erysipelas epidemic broke out in Chicago, along the South Branch of the Chicago River. Thereupon, in cooperation with the trustees of the Illinois and Michigan Canal, the City of Chicago provided for the operation of the Bridgeport Pumping Station at the northern terminus of the Illinois and Michigan Canal, to pump more water through the Illinois and Michigan Canal from the West Fork of the South Branch of the Chicago River, the South Branch of the Chi-

cago River, the Chicago River itself, and from Lake Michigan, to cleanse those rivers. (Appellant's Narrative, p. 270.)

April 16, 1865, the General Assembly of Illinois authorized the City of Chicago, at its expense, to complete the Illinois and Michigan Canal from Chicago to Joliet upon the original Deep Cut Plan, whereby more water would be withdrawn from Lake Michigan through the Chicago River and its branches by gravity, one of the preambles to said act being as follows:

> "Whereas, it has been represented that the City of Chicago, in order to purify or cleanse Chicago River, by drawing sufficient quantity of water from Lake Michigan, directly through it, and through the summit division of the Illinois and Michigan Canal, would advance a sufficient amount of funds to accomplish this desirable object." (Appellant's Narrative, p. 417.)

Pursuant to this act, the Illinois and Michigan Canal was completed in 1871 on the Deep Cut Plan at an expense of upwards of $3,000,000, and thereafter more water was drawn through it from Lake Michigan—upwards of 40,000 cubic feet per minute. (Appellants' Narrative, p. 419.)

In 1881 the City of Chicago having greatly increased in population, the Chicago River having become badly polluted, contaminating the Lake Michigan water supply, the General Assembly of Illinois by resolution authorized the City of Chicago to install pumps at the northern terminus of the Illinois and Michigan Canal to withdraw from Lake Michigan through it, not less than 60,000 cubic feet of water per minute. (Appellant's Narrative, p. 49.)

These pumps were installed in 1884. The installation of the pumps, however, did not relieve pollution of the Chicago River and the water supply. A great flood in 1885 caused great quantities of filth to be carried out into Lake Michigan, further polluting the water supply. (Appellant's Narrative, p. 274.)

As a result, typhoid fever epidemics existed. The people of Chicago and vicinity became aroused concerning the danger

to health (Appellant's Narrative, p. 274.) Whereupon, January 27, 1886, a resolution passed the City Council of Chicago, authorizing the appointment by the Mayor of a Commission of Engineers, to be known as the **Drainage and Water Supply Commission.** The resolution stated the duties of this Commission to be—

> "to consider all plans relating to drainage and water supply which may be brought to its attention; to make such examinations and investigations and surveys as may be deemed necessary; to collect all information bearing on this problem; to consider all recent developments in the matter of sewage disposal and their application to our present and future needs; to consider and meet necessity of increasing our water supply and of protecting the same from contamination; to remedy our present inadequate methods of drainage and sewage disposal; to consider the relation of any system proposed to adjacent districts and whether there may not be a union between the city and its suburbs to solve the great problem; to determine the great question as to the interest which the State and the United States may have in the disposal of sewage by way of the Illinois River, and to devise plans to meet any objections thereto, if such a system shall be thought best; and in general to consider and report upon any and all things which relate to the matter of water supply and drainage of the City of Chicago." (Appellant's Narrative 424.)

The Commission was further instructed by the resolution to report in a comprehensive manner upon all phases of the question and *"not later than the convening of the next session of the Illinois Legislature in January,* 1887."

Accordingly, pursuant to the resolution of the City Council of Chicago, the Mayor appointed three eminent engineers of national standing—Rudolph Hering, as Chief Engineer, Benzette Williams and S. G. Artingsall as consulting engineers. The report of the Drainage and Water Supply Commission was made January 30, 1887, to the Mayor and City Council of Chicago, and a copy of the resolution under which the Commission was appointed, appears in said report.

The Commission made an examination and investigation of the entire subject, and among other things stated, reported and concluded as follows (Appellant's Narrative, p. 427):

"The examination disclosed the fact that the city is sometimes greatly suffering from the offensive condition of parts of the Chicago river and its branches, caused by the discharge of sewage into the same, and from the occasional contamination of its water supply, brought about by the discharge of the polluted contents of the river into the lake. It also disclosed the fact that almost every conceivable way of dealing with these questions had been suggested, and in some forms applied during the past thirty years.

"The problem therefore demands the attainment of two ends—the protection of the water supply and the removal of the river nuisance. As the water must be taken from the lake, it is evident that both its pollution and the objectionable condition of the rivers should be prevented by a better disposition of the sewage. It is, therefore the latter question which constitutes the main objection of this investigation.

"Among the possible methods of getting rid of the Chicago sewage there are but three that have been deemed worthy of an extended consideration, namely: A discharge into Lake Michigan, a disposal upon land, and a discharge into the DesPlaines River. The preliminary work has, therefore, been confined to these three projects, and was classed as topographic, hydrographic, and miscellaneous."

* * *

"The hydrographic work consisted in ascertaining the flow of the DesPlaines River, the rainfall upon its area, its flood discharges, the character of its bed, and the probable effect of discharging the Chicago sewage into it when diluted by a large and constant stream of water from the lake. It consisted, further, in examining the nature of the currents in the lake and in studying the rise and fall of its level, and in ascertaining the amount and character both of the sewage discharged into it and of the deposits in the river and lake in front of the city to determine the effects of the present sewage disposal.

"Inquiry and surveys were made to show the feasibility of purifying the Chicago sewage by filtration on land."

* * *

"When the sewage works of this city were designed, in 1856, by Mr. E. S. Chesbrough, it was apprehended that ultimately some means would have to be found to change the water in the river from time to time or to keep the sewage entirely out of it. The first steps toward improving the condition of the river was taken by deepening the Illinois and Michigan Canal, so as to cause a current from the lake to the DesPlaines River at Lockport. The next step was the building of the Fullerton avenue conduit in order to produce a circulation in the North Branch; and the last step was the erection of the canal pumping works to increase the flow in the river, which had become greatly polluted."

* * *

"The depth and character of sewage deposits in the river and harbor, as might be expected, vary considerably. They are not great in the track of the vessels, but increase toward the docks and quieter portions of the slips, where they reach a depth of from one to four feet. While the deposits in the channel are of a heavier kind, such as cinders, those in the docks are mostly a foul mass of decomposing organic matter. No form of life is found to exist above Clark street bridge as far north as Clybourn place and as far south as Ashland avenue. The effect of this condition of the river is to endanger the purity of the water supply whenever the river, with its accumulated deposits, flows into the lake, which occurs when the rain water that finds its way into the river exceeds the amount pumped into the canal. If this excess is great, as in the spring and occasionally in the summer months, the contamination of the lake is considerable, and must constantly increase.

"From the foregoing it is seen that the present method of disposal of the sewage from Chicago and its suburbs is partly by discharging it into Lake Michigan, but mainly, except during floods, by discharging it into the DesPlaines River."

* * *

"The growth of Chicago has been frequently quoted as phenomenal."

* * *

"This fact, together with the probable growth of Chicago, shows it to be economical and judicious at present to plan works sufficiently extensive to dispose of the sewage of not less than 2,500,000 inhabitants."

* * *

"A third solution of the drainage problem is rendered practicable by the fact that the divide between Lake Michigan and the Mississippi Valley lies about 10 miles west of Chicago, with so slight an elevation that it is not a difficult matter to carry the sewage from the city westward into the DesPlaines River, and thence into the Mississippi River."

* * *

"The possibility of this solution was recognized as early as 1856 by Mr. E. S. Chesbrough, and the first step towards its adoption was taken, as already mentioned, by turning the sewage into the Illinois and Michigan Canal. Not until quite recently, however, has it become practicable to consider the construction of a special waterway for sewage removal, because when the population was smaller the expense of the undertaking was too great."

* * *

"A second branch of the investigation extends to the elements governing the proper size of the waterway from which a large proportion of the storm water has been excluded. The area still draining into it will consist largely of paved streets and roofs, allowing of no absorption and shedding the water rapidly. It requires a careful consideration to determine the maximum quantity of water that may enter the proposed channel, and for which an ample allowance must be made to prevent a back flow of the polluted water to the lake."

* * *

"The proposed waterway should, of course, provide immunity from offense at all times."

* * *

"A third branch of the inquiry covers the selection of routes for the proposed canals.

"Between Chicago and Summit three lines are practicable—one following the west fork and Ogden ditch, and another extending from the southwestern end of the south fork in a westerly direction to the Ogden ditch, and thence to Summit, and a third being an enlargement of the present canal."

* * *

"For the drainage of the Calumet region a simple inspection shows that a canal should start from the river at the southern point of Blue Island, and extend almost directly westward to the DesPlaines Valley at Sag."

* * *

"In the foregoing we have outlined the main features of the only three feasible methods of disposing of the metropolitan sewage, and have given the results of the investigation reached to date."

* * *

"Besides the economical advantages of the DesPlaines scheme, its superiority is still further emphasized by advantages of another kind. The proposed canal will, from its necessary dimensions and its regular discharge, produce a magnificent waterway between Chicago and the Mississippi River, suitable for navigation of boats having as much as 2,000 tons burden. It will establish an available water power between Lockport and Marseilles fully twice as large as that of the Mississippi River at Minneapolis, which will be of great commercial value to the state. The Calumet region will be much enhanced in value by having a direct navigable channel to the DesPlaines River and by a lowering of the flood heights of Calumet Lake and River. Within the city the water of the Chicago River and its South Branch will get a much better circulation if it flows by gravity than if it has to be pumped, the necessity for which would remain even if the sewage should be discharged through intercepting sewers, either into the lake or upon land. Upon either of the latter conditions an occasional overflow from the sewers into the river during heavy rains would be more objectionable than a constant discharge of sewage into a more rapidly flowing stream. Flood waters entering the lake by way of the Chicago River would carry into it much filthy matter, either suspended or deposited, notwithstanding the existence of intercepting sewers, but the proposed diversion of such waters before reaching the populated districts will for all time obviate this undesirable occurrence."

* * *

"In reaching the conclusion that the sewage of the city should be discharged into the Mississippi Valley the question of water supply is materially simplified, because the lake will then at all times furnish good water wherever intakes are desired for an extension of the works."

The report of the Drainage & Water Supply Commission, above mentioned, was made, as required by the resolution of the City Council of Chicago under which the Commission was established, in time for the session of the General Assembly of Illinois of 1887. While the subject was

considered at this session of the General Assembly and a bill was introduced, it was not passed, and there was constituted a joint committee of the House and Senate to sit *ad interim* to consider the subject matter and future legislation. (Appellant's Narrative, p. 280.) The joint committee was empowered to and did obtain the advice of counsel, and John P. Wilson, late of the Chicago Bar, was one of its legal advisors. (Appellant's Narrative, p. 282.) This committee, reported to the next session of the General Assembly, after making a thorough investigation of various questions involved, and finally, on May 29, 1889, the bill was passed under which appellant was organized and now exists. This act became in force on July 1, 1889.

The Act, hereinafter, for convenience, called "The Sanitary District Act", was a culmination of the efforts of the State and Federal Government to comprehensively improve and enlarge the old waterway existing from time immemorial between Lake Michigan, the Illinois and Mississippi River and the Gulf of Mexico, and also the efforts of the State and the City of Chicago, beginning practically at the time Chicago became a city, to protect the Lake Michigan water supply and dispose of the drainage and sewage of the city.

THE SANITARY DISTRICT ACT DESCRIBED.

(Appellant's Narrative, p. 69.)

While the Act was in terms general and applied to any territory that might come within its specifications, yet it was generally understood that there was no similar situation in Illinois, and the Act may be considered as a special act to meet the conditions then confronting Chicago and its environs.

Pursuant to Section 1 of the act, appellant was organized and given its name by a proper petition filed as provided, and by an election held on November 5, 1889. The trustees, being the corporate authorities of the municipality thus organized, were elected in December following, and the trustees took office and organized as a Board immediately.

Express powers were given under the act to (Section 7)

> "provide for the drainage of such district by laying out, establishing, constructing and maintaining, one or more main channels, drains, ditches and outlets for carrying off and disposing of the drainage, including the sewage of such district, together with such adjuncts and additions thereto as may be necessary or proper to cause such channels or outlets to accomplish the end for which they are designed, in a satisfactory manner; also to make and establish docks adjacent to any navigable channel made under the provisions hereof for drainage purposes, and to lease, manage and control such docks, and also to control and dispose of any water power which may be incidentally created in the construction and use of said channels, or outlets, but in no case shall said Board have any power to control water after it passes beyond its channels, waterways, races or structures into a river or natural waterway or channel or water power or dock situated on such river, natural waterway or channel:" (Appellant's Narrative, p. 28.)

To carry out these express powers, appellant was authorized to levy taxes, borrow money, purchase real estate, and let contracts.

NOTE: The Illinois Supreme Court held the act constitutional on June 12, 1890.

Section 12 prohibited appellant from building over or across its Sanitary & Ship Canal, immovable bridges. It was expressly provided that all bridges built should not interfere with or obstruct navigation, and should be so constructed that they could be raised, swung or moved out of the way of vessels, tugs or boats.

In order to permit and empower the District to improve the Chicago River and its various branches, enlarge the Illinois and Michigan Canal if found to be a suitable site for the Sanitary & Ship Canal, and to reverse the Calumet River, Section 17 provided:

> "When it shall be necessary in making any improvements which any district is authorized by this act to make, * * * such district shall have the power to * * * and may enter upon, use, widen, deepen and improve any navigable or other waters, waterways, canal or lake:" (Appellant's Narrative, p. 69.)

Section 20 expressly directed appellant to turn into the channel or channels constructed as outlets for the sewage and drainage within its limits,

> "not less than 20,000 cubic feet of water per minute for every 100,000 inhabitants of said district, and shall thereafter maintain the flow of such quantity of water." (Appellant's Narrative, p. 71.)

Section 21 authorized the Attorney General to compel compliance with the above mentioned provision of Section 20.

Section 23 specified the dimensions and capacity of the Sanitary and Ship Canal.

> "23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the DesPlaines or Illinois river such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet, and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan, of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and

a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water. If the population of the district draining into such channel shall at any time exceed 1,500,000 such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the DesPlaines or Illinois Rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said DesPlaines or Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed to the Desplaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act, may correct, modify and remove obstructions in the Desplaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Cooperas Creek in the Illinois river, before any water shall be turned into the said channel. * * *" (Appellant's Narrative, p. 72.)

Note: If appellant exercised the power to build outlets for the sewage and drainage within its territorial limits, it was compelled to construct it through a rocky stratum and through the Des Plaines River to Lockport and Joliet. Appellant waived the condition stated in the act that the General Government should improve the DesPlaines and Illinois Rivers, and built its main channel, or the Sanitary and Ship Canal, of a capacity throughout of not less than 600,000 cubic feet per minute, or 10,000 per second.

Section 24 provided that the Sanitary & Ship Canal should be a navigable water of the United States, under the control of the Government for navigation purposes, but not for sanitary or drainage purposes.

Section 26 gave the right to any municipality contiguous to the City of Chicago and within the territorial limits of appellant, to receive water obtained by Chicago from Lake Michigan for drinking and domestic purposes. (Appellant's Narrative, p. 75.)

Section 27 provided for the appointment of a commission by the Governor to inspect the Sanitary & Ship Canal and report as to whether the appellant had complied in the construction of it with the provision of the Sanitary District Act.

The appellant immediately entered upon the construction of the canal, by making the surveys provided for by the Drainage & Water Supply Commission report above mentioned, which formed the basis of the Sanitary District Act, and pursuant to the act itself. (Appellant's Narrative, p. 286.)

UNITED STATES ENGINEERS' ACTS CONCERNING THE SANITARY AND SHIP CANAL.

Captain Marshall, U. S. Engineer stationed at Chicago, immediately reported to the Chief of Engineers the action of the Drainage & Water Supply Commission and the passage of the Act of May 29, 1889, *verbatim* copies of the Commission's report and of the Act being transmitted therewith. The report of Capt. Marshall is contained in the Chief of Engineers Reports to Congress for the year 1890. (Appellant's Narrative, p. 451.)

April 21, 1891, the Board of Trustees of the appellant, by resolution provided that the appellant should forthwith

> "enter upon, use, widen, deepen and improve the Chicago River from its mouth at Lake Michigan to the South Branch thereof, and also the South Branch thereof, together with the South and West Forks thereof, so as to make the same a proper and sufficient supply channel for the Main Channel heretofore surveyed from the Chicago River to Joliet;"

The resolution also provided that a copy of same should be, and it was, sent to the Secretary of War of the United States. (Appellant's Narrative, p. 454.)

The Chief of Engineers Reports to Congress for the year 1892, contained a report by Capt. Marshall, U. S. Engineer at Chicago, of the progress of the work of the appellant. (Appellant's Narrative, p. 454.)

August 9, 1893, Capt. Marshall reported to the Chief of Engineers, U. S. Army, that actual excavation of the Sanitary & Ship Canal had been commenced. This report was contained in the Chief of Engineers Reports to Congress for the year 1893. (Appellant's Narrative, p. 455.) Among other things, Capt. Marshall stated:

> "Without criticising in any way the local measures taken for local relief, it may be said that the state laws, if effectively executed for the purposes specified, seemingly require changes in the capacity of Chicago River

and its branches that may increase, may diminish, or may even entirely destroy their value for commercial purposes. In any case under existing laws, no alteration in the capacity of Chicago River can be made without the consent of the Secretary of War, or without full examination by agencies established by Congress, and the execution of the state laws are therefore limited by superior authority."

Further, Capt. Marshall's report stated:

"It will soon be necessary for Congress to provide for the extension to Lake Michigan of the navigation established on the Illinois River below LaSalle, and to determine to what extent, if at all, it will utilize for navigation the great channel now being cut by local authorities in the rock divide, separating Lake Michigan from the Mississippi Valley. The question is at hand and must be determined at some date not far in the future, whether the national highway will utilize this cut and Chicago River as part of this communication, or the Calumet River route in connection with this local channel, or otherwise. There are no other practicable routes."

* * *

"Should a discharge of 250,000 cubic feet per minute be required through the south branch and main river, wholesale modification of bridges, tunnels and docks, and a widening of the river at many points will be required, and deepening to at least 18 feet of water below Chicago city datum with a slope necessary for this discharge, will be required * * *"

The Chief of Engineers' Reports for the year 1895, contained a further report of Capt. Marshall to the Chief of Engineers of that year, and the report stated:

"The City of Chicago expects to turn into the channel of the Illinois at some future time 5,000 cubic feet of Lake Michigan water per second; at some more remote period there may be 10,000 cubic feet per second, but not probably within a generation." (Appellant's Narrative, p. 463.)

The Secretary of War appointed a Board of Engineers, consisting of Gen. O. M. Poe, Brig. Gen. E. H. Ruffner and Maj. W. L. Marshall, to consider and report upon

"the probable effect of the operation of the Chicago Drainage Canal upon the lake and harbor levels and

upon the navigation of the Great Lakes and their connecting waterways." (Appellant's Narrative, p. 464.)

This Board of Engineers reported, on August 16, 1895, to the Chief of Engineers, and among other things stated (Appellant's Narrative, p. 465.)

> "The Board met in Chicago August 12, 1895, and on the 13th and 14th accompanied the officers of the Drainage Canal over the line under construction. Every facility and courtesy possible has been extended by the Trustees and Engineers of the Canal for a full investigation of the subject matter".

The report of this Board of Engineers described the works under construction, the purpose of withdrawing approximately 10,000 cubic seconds feet of water from Lake Michigan through the Sanitary & Ship Canal. It was estimated that this would lower the levels of Lakes Michigan and Huron approximately six inches, and the other Great Lakes, except Lake Superior, in varying amounts, including their connecting channels.

June 16, 1896, appellant requested the Secretary of War for a permit to improve the South Branch and the West Fork of the Chicago River, to increase its capacity for the initial operation of the Sanitary & Ship Canal at its opening. The population of the District was then estimated to be approximately a million and a half people, requiring a diversion of 5,000 cubic seconds feet of water, in accordance with the statutory ratio of dilution. Among other things, the request for the permit stated (Appellant's Narrative, p. 88):

> "The work of the Sanitary District has progressed so far that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey Street, Chicago, to Lockport in Will County, twenty-eight miles distant.
>
> Our connection with Lake Michigan must be through the Chicago River, with the West Fork and the South Branch of which we make a junction at Robey Street."

Attached to the request, was a plan showing the improvements to be made on a certain section of the river. On June 24, 1896, Maj. Marshall reported to the Chief of Engineers, recommending the granting of a permit as requested, and in so doing, among other things stated:

> "As far as the work itself is concerned, there can be no objection to it, as in every case the navigation channel of the Chicago River will be improved." (Rec. Vol. VI, p. 3473.)

On July 3, 1896, in every respect following the recommendations of Maj. Marshall and those of the Chief of Engineers, the Secretary of War issued a permit for the improvement, requiring as a condition, however, that each by-pass, new dock and new bridge, be authorized by special permit.

Condition 2 provided (Appellant's Narrative, p. 474):

> "That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into the Chicago River. This latter proposition must be hereafter submitted for consideration."

On October 28, 1897, a request for permit for the improvement of certain other sections of the South Branch and West Fork of the Chicago River, was sent to the Secretary of War, the purpose of which was stated in the request to be

> "to conform to the plans of this District for securing an adequate flow of water through said stream. Our general plans have been heretofore submitted to the War Department. * * *" (Appellant's Narrative, p. 475.)

On November 16, 1897, pursuant to the recommendations of Maj. Marshall, U. S. Engineer at Chicago, a permit was granted by the Secretary of War, subject to the same conditions as were contained in the July 3, 1896, permit. (Appellant's Narrative, p. 475.)

November 30, 1898, January 13, 1899, March 10, 1899, and May 12, 1899, permits were granted by the Secretary of War to appellant to do various work in connection with the river

improvement, such as construction of bridges, building by-passes, coffer dams, etc. (Appellant's Narrative, p. 477.)

On February 23, 1898, pursuant to the invitation of appellant, the Rivers & Harbors Committee of the House of Representatives inspected the Sanitary & Ship Canal which was then substantially completed. (Appellant's Narrative, p. 184.)

On May 8, 1899, the Secretary of War issued a permit for the opening of the Sanitary & Ship Canal. There were certain preambles to the permit stating the purposes of the appellant's works and the request of the appellant for a permit. The permit, not including said preambles, is as follows:

> "Now therefore, The Chief of Engineers having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said Sanitary District of Chicago to open the channel constructed and cause the waters of Chicago river to flow into the same, subject to the following conditions:
>
> 1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.
>
> 2. That if, at any time, it become apparent that the current created by such drainage works in the south and main branches of the Chicago river, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago river and its South Branch.
>
> 3. That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago river." (Appellant's Narrative, p. 481.)

Prior to the issuance of the said permit, complete investigation of the subject matter was made by Maj. Marshall, U. S. Engineer at Chicago, the result of which is embodied

in his report to the Chief of Engineers dated April 24, 1899, portions of which are as follows:

> "* * * In my opinion the abstraction of from 300,000 to 600,000 cubic feet per minute will permanently lower Michigan, Huron and Erie from three to eight inches; not more than eight nor less than three, corresponding to an extreme reduction of from 160 to 466 tons in carrying capacity of the large vessels of the lakes, and that it will take from three to four years for this full effect to be obtained."
>
> "* * * Individually I have to say that I am in entire sympathy with the people in their effort to purify their water supply. I have lost my only son from typhoid fever, produced, I believe from drinking water polluted by defective drainage at Chicago, which this channel will correct. In every proper way I have aided the officers of the Drainage District. I would like further to aid them, but I believe this question to be entirely out of my sphere, and too great and important for me even to venture an opinion or make a recommendation about. Yet I may venture to suggest that the entire subject be referred to Congress for final solution, and that a conditional permit or authority be granted to the authorities of the Chicago Sanitary District by the War Department, awaiting action by Congress, to open their channel * * *." (Appellant's Narrative, p. 478.)

Prior to the issuance of the permit of May 8, 1899, General Alger, the Secretary of War, who issued the permit and Gen. John M. Wilson, the Chief of Engineeers, who recommended its issuance, personally inspected the appellant's works. (Appellant's Narrative, p. 338.)

The Commission appointed by the Governor of Illinois under Section 27 of the Sanitary District Act, certified that the Sanitary & Ship Canal had been completed in all respects in accordance with the provisions of Section 23 of said Act. Thereupon, on January 17, 1900, the Sanitary & Ship Canal was opened, placed in operation, and has been continuously operated. Improvements had been made as heretofore stated, in the Chicago River, the South Branch and the West Fork thereof, to provide for a flow from Lake Michigan through the channels of said rivers to the Sanitary & Ship Canal, of

approximately 300,000 cubic feet per second, without creating a current unduly obstructive to navigation in the Chicago River, the population of appellant being then approximately a million and a half of inhabitants.

The channels of the Chicago River, the South Branch and the West Fork thereof, were then, however, narrow, shallow and tortuous, being only 17 feet deep and at places only 90 feet in width, with many obstructive center pier bridges. To provide immediately for the increase in population, and to prevent these rivers from flowing into Lake Michigan, carrying pollution to the water supply, when the run-off of the Chicago River drainage area exceeded 300,000 cubic feet per minute, a plan for the comprehensive improvement of the Chicago River and its branches to the northern terminus of the Sanitary & Ship Canal was adopted by appellant. This plan provided for the deepening of the channels of these rivers at all points to 26 feet, and widening them to 200 feet, replacement and reconstruction of obstructive bridges with new bridges of the bascule type and the wideming of bridge openings.

Two requests for permits to carry out these plans were made to the Secretary of War, dated April 26th and June 7th, 1900, respectively. The two requests covered the entire stretch off the channels of the South Branch and the West Fork to the northern terminus of the Sanitary & Ship Canal. They stated the purpose of appellant in improving the said river channels, and described the width and depth of the river channels as they would be when the plan was carried out, and that

> "the work to be done is to be prosecuted progressively as to time, the rate of progress being limited by the rapidity with which the right of way may be acquired and the resources for the execution of the work to be made available." (Appellant's Narrative, p. 90.)

Thereupon, on July 11, 1900, the Secretary of War issued two permits, as requested by the application of April 26th

and June 7th, 1900, respectively, above mentioned. The two permits, after referring to the application, each stated:

> "I beg to inform you that there is no objection on the part of the War Department to the prosecution of work of improvement of Chicago River, specified in the above mentioned letter, and delineated on the maps which accompany the same, it being understood that this statement as to the attitude of the War Department shall not be understood as involving the General Government in any way with the expense incident to the carrying out of the project, and does not in any way invalidate, waive or affect the right of the Secretary of War to regulate or revoke the permit granted under date of May 8, 1899, to the Sanitary District of Chicago to divert the waters of the Chicago River and cause them to flow into the artificial channel, such permission being subject to the following conditions, viz." (Appellant's Narrative, p. 91.)

The conditions were precisely the same as contained in the May 8, 1899, permit for the opening of the channel. (this Brief p. 38.)

Orders of Secretary of War claimed by appellee to modify the May 8, 1899 permit.

The first modification of the permit of May 8, 1899, was made by the Secretary of War on the 9th of April, 1901, solely because of the current in the Chicago River. This modification was contained in a document signed by the Secretary of War which, after reciting the issuance of the permit of May 8, 1899, to open the Sanitary & Ship Canal, and Condition 2 thereof—namely that the Secretary of War might modify and restrict the flow if it should prove unreasonably obstructive to navigation on the Chicago River, provided:

> "And whereas it is alleged by various commercial and navigation interests that the present discharge from the river into the drainage canal sometimes exceeds 300,000 cubic feet per minute, causing a velocity of nearly 3 miles per hour, which greatly endangers navigation in the present condition of the river.

> "Now, therefore, this is to certify, that the Secretary of War, upon the recommendation of the Chief of Engineers, hereby directs said Sanitary District to regulate the discharge from the river into the drainage channel, so that the maximum flow through the Chicago river and its South Branch, shall not exceed 200,000 cubic feet per minute." (Appellant's Narrative, p. 23.)

On July 23, 1901, on the application of the Sanitary District, the Secretary of War amended the direction of April 9, 1901, providing that the flow through the river to the Sanitary & Ship Canal might be increased to 300,000 cubic feet per minute between the hours of 4:00 P. M. and 12:00 o'clock midnight. (Appellant's Narrative, p. 24.)

On December 5, 1901, the Secretary of War directed the appellant to limit the flow through the Chicago River, the South Branch and West Fork thereof, to 250,000 cubic feet per minute throughout the 24 hours of the day. The document so directing appellant, recited the issuance of the permit of May 8, 1899, for the opening of the Sanitary & Ship Canal, and Condition 2 thereof with reference to navigation on the Chicago River and the various directions of the Secretary of War thereafter made. (Appellant's Narrative, p. 24.)

On January 17, 1903, the Secretary of War, after reciting the issuance of the original permit of May 8, 1899, and the directions made thereunder, consented to appellant's increasing the flow until the 31st day of March, 1903, to 350,000 cubic feet per minute, and directed that thereafter it should be reduced to 250,000 cubic feet per minute throughout the 24 hours of the day, as prescribed by the direction of December 5, 1901. It is therefore upon this direction or so-called permit of December 5, 1901, that this litigation is based, as the Secretary of War did not thereafter issue any other permits or give any further directions with reference to the flow through the Chicago River, the South Branch and the West Fork thereof, to the northern terminus of the Sanitary & Ship Canal. (Appellant's Narrative, p. 25.)

Chicago River improvement under appellant's project of 1900, made pursuant to the permits of the Secretary of War of July 11, 1900.

Almost immediately upon the opening of the Main Channel, January, 1900, and after the permits of the Secretary of War above mentioned were issued, the appellant commenced the improvement of the South Branch and West Fork thereof, by acquiring many pieces of right of way for the river widening, (792,000 square feet). The channels were deepened from 17 feet to 26 feet throughout, and widened at all points to 200 feet, an average of 50 feet being taken off of the river channels at various points. The most at any one place was 110 feet. It involved the excavation of 5,500,000 cubic yards of material, and the construction of over 19,000 lineal feet of dock. This improvement also required the replacement of old center pier bridges with modern bascules. The bridges being built were State Street, Dearborn Street, Randolph Street, Jackson Boulevard, Harrison Street, Taylor Street, Chicago Terminal Transfer Railroad Bridge, 18th Street, 22nd Street, Main Street, Throop Street, Ashland Avenue, Washington Street. (Appellant's Narrative, p. 182.)

This work was practically completed prior to February 5, 1912, when the Sanitary District asked that the limitation of 4,167 seconds feet be removed, and that it be specifically authorized to divert 10,000 cubic seconds feet by means of its various diversion sources. (Appellant's Narrative, p. 395.)

Appellant also deepened the North Branch of the Chicago River, making it 12 feet deep, 90 feet wide and navigable. The South Fork of the South Branch was also deepened to 20 feet. (Appellant's Narrative, p. 183.)

The Chicago River proper was deepened by the United States to 20 feet at all points.

The Chicago River improvement described enabled appellant to draw through the Chicago River, the South Branch and the West Fork, and divert to and through the Sanitary & Ship Canal, 10,000 cubic seconds feet of water, so that

the current in the river channels would not be over one and one-quarter miles per hour and therefore not injurious to navigation on said river. A mile and a quarter an hour was the velocity the Secretary indicated to be acceptable. (Appellant's Narrative, p. 182.)

Acts amendatory and supplementary to the original Sanitary District Act of May 29, 1889.

In connection with the Chicago River improvement, the General Assembly passed an act approved May 13, 1901, in force July 1, 1901, expressly authorizing appellant to construct bridges over any river made necessary

> "by reason of widening, deepening or improving of such river." (Appellant's Narrative, p. 30.)

May 14, 1903, the General Assembly of Illinois passed an act, in force July 1, 1903, authorizing the annexation to the appellant's corporate limits of certain territory south of 87th Street of the City of Chicago, known as the Calumet Region, and certain territory north of the City of Chicago, to embrace what is called the North Shore Suburbs. The act authorized appellant to construct and maintain channels, drains, ditches and outlets for this additional territory, substantially the same as authorized for the original Sanitary & Ship Canal under the Act of May 29, 1889: To cut through the Illinois & Michigan Canal and thus destroy it between Joliet and Chicago, on condition, however, that it build a proper lock at its southern terminus to connect with the Des Plaines River, and a channel not less than 10 feet deep and 100 feet wide to connect with the upper basin of the Illinois & Michigan Canal at Joliet, thus making proper connection with the Illinois & Michigan Canal at Joliet, permitting boats to pass from Joliet over the Sanitary & Ship Canal to Chicago and Lake Michigan. Another condition was that there should be reserved and provided by the appellant at its southern terminus, a site for a lock 800 feet in length and 130 feet

in width, to be used in case of enlargement of the waterway.

Section 3 of this act provided:

> "Said Sanitary District shall permit all water-craft navigating or purposing to navigate said Illinois & Michigan Canal, to navigate all of said channels of said Sanitary District promptly, without delay, and without payment of any tolls or lockage charges for so navigating in said channel."

Sections 5 and 6 of this act expressly authorized the District to make available the water power at the southern terminus of its main channel to be used in the operation of its own pumping plants and machinery, and to be sold for public purposes to cities, villages and towns within the limits of the District.

Section 8 of the act provided:

> "The said Sanitary District shall, at the expense of said District, in all respects comply with the provisions of the acts of Congress of March 30, 1822, and March 2, 1827, as construed by the courts of last resort of the State of Illinois and of the United States in relation to the Illinois & Michigan Canal so far as it affects that portion of the Illinois & Michigan Canal vacated or abandoned by the terms of this act." (Appellant's Narrative, p. 32.)

Pursuant to the Act of May 14, 1903, the Calumet Sag Channel was constructed and completed in the year 1922, extending from the Little Calumet River to the Sanitary & Ship Canal at Sag, Illinois, and likewise the North Shore Channel was constructed and completed in the year 1910, extending from the North Branch of the Chicago River to the Lake Shore at Wilmette, Illinois. (Appellant's Narrative, p. 137.)

JANUARY 8, 1913, SECRETARY OF WAR STIMSON REFUSED TO REMOVE THE ALLEGED LIMITATION ON THE WITHDRAWAL OF WATER THROUGH THE CHICAGO RIVER, SOUTH BRANCH AND WEST FORK, AND TO FIX IT AT 10,000 SECONDS FEET, AS REQUESTED BY APPELLANT.

The Chicago River Improvement Project of 1900 having been substantially completed, so that a current would not exist injurious to navigation on the Chicago River and its branches, on February 5, 1912, the appellant asked the Secretary of War to remove the alleged limitation of December 5, 1901, made, at that time, because of the current in the Chicago River, the South Branch and the West Fork thereof. This amount, 10,000 cubic seconds feet, was necessary in order to keep the said rivers at all times reversed and flowing away from Lake Michigan, (Appellant's Narrative, p. 12) thus protecting the water supply. The Secretary of War, however, refused by memorandum dated January 8, 1913. (Appellant's Narrative p. 12.) The memorandum of Secretary of War Stimson concluded as follows:

> "1. That the diversion of 10,000 cubic feet per second from Lake Michigan as applied for in this petition, would substantially interfere with the navigable capacity of the navigable waters in the Great Lakes and their connecting rivers.
>
> "2. That being so, it would not be appropriate for me, without express Congressional sanction, to permit such a diversion, however clearly demanded by the local interests of the sanitation of Chicago.
>
> "3. That on the facts here presented, no such case of local permanent necessity is made evident.
>
> "4. That the provisions of the Canadian Treaty for a settlement by a Joint Commission of 'questions or matters of difference' between the United States and Canada, offer a further reason why no administrative offi-

cer should authorize a further diversion of water manifestly so injurious to Canada, against Canadian protest." (Appellant's Narrative, p. 16.)

Thereupon the principal branch of this litigation was instituted by the complaint filed October 6, 1913, heretofore described.

NOTE: Appellant contends that the memorandum of the Secretary of War is immaterial. His only power was to grant or refuse the permit.

ACTS OF CONGRESS AND REPORTS AND RECOMMENDATIONS OF BOARDS OF ENGINEERS AND COMMISSIONS, PURSUANT TO SUCH ACTS, PASSED AND MADE SUBSEQUENT TO THE PASSAGE OF THE SANITARY DISTRICT ACT OF MAY 29, 1889, RELATING TO THE PRESERVATION AND COMPLETE UTILIZATION TO THE FULL AMOUNT OF APPELLANT'S DIVERSION.

Under the Rivers and Harbors Act of June 3, 1896, (Laws Improvement of Rivers & Harbors, Vol. 1, p. 793, U. S. Stat. at large Vol. 29, p. 202), the following item appeared for survey and examination:

> "The Upper Illinois River and Lower DesPlaines River, with a view to extension of navigation from Illinois River to Lake Michigan at or near Chicago."

Pursuant to this act, Gen. W. L. Marshall made a report, dated January 27, 1897, which was transmitted to Congress March 3, 1897, as H. R. Document No. 33, 54th Congress, 2d Session. Among other things, this report stated:

> "The Sanitary District of Chicago has nearly completed a canal for drainage purposes from Chicago River at Robey street to near Lockport from 18 to 22 feet in depth below the proposed water surface, and varying in width from 160 feet in rock to more than 200 feet in earth, a length of 28 miles, which may be made available as part of any enlarged waterway over the route in question, and is of much greater dimensions than required by any commercial canal adapted for the conditions and requirements of present or prospective traffic by water between Lake Michigan and the region along the water courses of the Mississippi Valley. To comply with the law of the State of Illinois under which this drainage canal is constructed—*it has been constructed of a capacity to discharge* 600,000 *cubic feet per minute through the section excavated in rock and* 300,000 *cubic feet per minute*

Note: In referring to the Rivers and Harbors Acts of Congress for convenience we use "Laws of the United States relating to the Improvement of Rivers and Harbors, from August 11, 1790, to March 4, 1913," H. R. Document No. 1491, 62nd Congress, 3rd Session, copies of which for each member of the court are provided.

throughout the earth section—the law requires a discharge of 20,000 *cubic feet per minute for each* 100,000 *inhabitants of the drainage district which at present requires more than* 300,000 *cubic feet and in a few years will require the full* 600,000 *cubic feet discharge through the canal. The taking of water from Lake Michigan, however, for drainage purposes (or rather for dilution of sewage) has not yet been authorized by Congress."* (Appellant's Narrative, p. 487.)

This report is referred to in the following item of the Rivers & Harbors Act of March 3, 1899, which contained Sections 9 and 10 under which the Secretary of War seeks to regulate the Chicago diversion (This Brief, p. ....)

"Illinois River and DesPlaines River, Illinois: The Secretary of War is directed to appoint a board of three engineers, which board shall make a survey and estimates of cost for the improvement of the Upper Illinois River and Lower DesPlaines River, in Illinois, with a view to the extension of navigation from the Illinois River to Lake Michigan at or near Chicago; said board of engineers shall report the estimates of cost for a channel seven feet deep, and also for a channel eight feet deep, throughout said proposed route; said survey and estimates of cost shall be made in pursuance of and according to the recommendations in report of January twenty-seventh, eighteen hundred and ninety-seven."

Act of Congress of June 6, 1900, further carrying out the purpose of said Act of March 3, 1899, provided (Laws Improvement of Rivers and Harbors, Vol. 2, 914; U. S. Stat. at large, Vol. 31, p. 578.)

"That the board of three engineers, appointed by the Secretary of War, in pursuance of a paragraph in the river and harbor act approved March third, eighteen hundred and ninety-nine, to make a survey and estimates of cost of the improvement of the Upper Illinois River and the lower DesPlaines River in Illinois, with a view to the extension of navigation from the Illinois River to Lake Michigan at or near the City of Chicago, is hereby authorized to report the estimates of cost for a channel ten feet deep, and for a channel twelve feet deep, and for a channel fourteen feet deep through said proposed route, and that the said estimates cover and include a proper *connection at Lockport with the sanitary and*

ship canal which has been constructed by the sanitary district of Chicago. The said board of engineers is also further authorized to make a survey and estimates of cost for the improvement of the Lower Illinois River from the end of said proposed route to the mouth of said river, for channels ten, twelve and fourteen feet deep, respectively, and to report the estimates of cost thereof:"

Act of Congress of June 13, 1902, provided (Laws Improvement of Rivers and Harbors, Vol. 2, 995; U. S. Stat. at large, Vol. 32, p. 573):

"The sum of two hundred thousand dollars, or so much thereof as may be necessary, is hereby appropriated for making such surveys, examinations, and investigations as may be required to determine the feasibility of, and to prepare and report plans and estimates of cost of, a navigable waterway fourteen feet in depth from *Lockport,* Illinois, by way of the DesPlaines and Illinois rivers, to the mouth of said Illinois River, and from the mouth of the Illinois River, by way of the Mississippi River, to Saint Louis, Missouri."

Section 4 of the same act provided for the establishment of the International Waterways Commission, to make among other things a study and report to Congress upon the regulation of diversions of water. The members of the International Waterways Commission appointed under said Act, were to act in conjunction and cooperation with members of said Commission to be appointed by the Government of Canada. Said section is in part as follows (Laws Improvement of Rivers and Harbors, Vol. 2, 1007):

"That the President of the United States is hereby requested to invite the Government of Great Britain to join in the formation of an international commission, to be composed of three members from the United States and three who shall represent the interests of the Dominion of Canada, whose duty it shall be to *investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada, including all of the waters of the lakes and rivers* whose natural outlet is by the River Saint Lawrence to the Atlantic Ocean; *also upon the maintenance and regulation of suitable levels; and also upon the ef-*

fect upon the shores of these waters and the structures thereon, and upon the interests of navigation, by reason of the diversion of these waters from or change in their natural flow; and further, to report *upon the necessary measures to regulate such diversion,* and to make such recommendations for improvements and *regulations as shall best subserve the interests of navigation in said waters.* The said Commissioners shall report upon the advisability of locating a dam at the outlet of Lake Erie, with a view to determining whether such dam will benefit navigation, and if such structure is deemed advisable, shall make recommendations to their respective Governments looking to an agreement or treaty which shall provide for the construction of the same, and they shall make an estimate of the probable cost thereof."

Resolution of April 21, 1904, specifically with reference to the crests of the dams at Kampsville and La Grange is as follows (Laws of United States relating to Improvement of Rivers and Harbors, Vol. 2, 1049; U. S. Stat. at large, Vol. 33, p. 589):

"*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That the Secretary of War is hereby authorized, in his discretion, with the concurrence of the Chief of Engineers, to permit the Sanitary District of Chicago, at the expense of said corporation, to lower the height of the Government dams in the Illinois River at Kampsville and LaGrange, Illinois, in accordance with such plans as he may prescribe and subject to such stipulation and conditions as, in his judgment, may be necessary to protect the interests of the United States."

The appellant, by permit and authorization of the Secretary of War, partially removed the crests of said dams. (Appellant's Narrative, p. 399.)

Section 1 of an Act of Congress of June 29, 1906, provided (Laws Improvement of Rivers and Harbors, Vol. 2, 1192; U. S. Stat. at large, Vol. 34, p. 626):

"That the diversion of water from Niagara River or its tributaries, in the State of New York, is hereby prohibited, except with the consent of the Secretary of War as hereinafter authorized in section two of this Act: *Provided, that this prohibition shall not be interpreted as*

forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States under its direction."

Section 2 of this Act for the Preservation of Niagara Falls, authorized the Secretary of War to grant permits for the diversion of the Niagara River in New York for power purposes, with certain limitations as to gross amount, the principal object being to enable the operation of existing power plants.

Section 3 provided a penalty upon persons diverting water contrary to the provisions of the act.

Section 4 requested the President of the United States to open negotiations with the Government of Great Britain, looking towards the making of a treaty for regulation and control of the waters of the Naigara River and its tributaries.

Section 5 provided that the act should remain in force for three years.

Section 6 appropriated $50,000 to carry out the provisions of the act.

Section 7 reserved the right to alter, amend or repeal the act.

The history of the passage of this act is important. April 11, 1906, the bill was introduced in the House and referred to the Committee on Rivers and Harbors. It was reported back with amendments and passed the House. In the Senate it was ultimately referred to the Committee on Foreign Relations, of which Senator Lodge was Chairman. Among other amendments made in the Senate, was the one offered by Senator Albert J. Hopkins of Illinois, (numbered 6),

"provided, however, that nothing contained herein shall be construed to hold or concede that the waters of Lake Michigan or other lakes or rivers wholly within the territory of the United States, are the subject of international negotiation".

The House nonconcurred in the Senate amendments, and asked for a conference. The conference was thereupon held, and the report of the conferees recommended that the Senate recede from the amendment offered by Senator Hopkins, on the ground that this amendment would embarrass the President in the negotiations with Great Britain suggested by Section 4 of the bill relating to the making of a treaty to fix the diversion of the Niagara River and its tributaries. (Congressional Record, Vol. 40, p. 9097.)

Senator Hopkins opposed the adoption of the conference report, for the reason that his amendment was rejected. In answer to Senator Hopkins, Senator Lodge, the chairman of the committee, and one of the conferees, stated:

> "*Mr. Lodge.* Mr. President, I had supposed that the Senator from Illinois (Mr. Hopkins) realizes that the report of this bill in its present condition would not in any way endanger the rights of Chicago to have water from the lake. Certainly I should have adhered to the amendment if I had thought that the drainage canal of Chicago would have been in any way endangered by the Commission. The House would not accept this amendment. It is attached to a clause which requests the President to enter upon negotiations. It, of course, is merely advisory. Congress cannot possibly restrict the powers of the Executive in making a treaty. The result of putting on this clause beforehand would have been to have made any negotiations impossible. No country would enter into negotiations with a limitation on the other side like that.
>
> The first section of the bill protects the rights of Chicago. No treaty would be made by our Commissioners which would impair or infringe those rights.
>
> Moreover, Mr. President, the fact that it must be a matter of treaty, while it is a protection also, I think, warrants me in saying that what Canada desires is not to limit in any way the outflow of water at Chicago, but to be able to have a corresponding amount credited to her when they come to an agreement as to how much water each country may divert from the stream.
>
> I think, Mr. President, it would be a very great misfortune if the report should be rejected. Every right is safeguarded. The conferees were as anxious as the Senator from Illinois could possibly be to protect the

drainage canal at Chicago, but they did not feel warranted in allowing the whole legislation for such an important object to fall."

The Rivers and Harbors Act of March 2, 1907, provided for the appointment of a board to make a survey and examination of a channel 14 feet deep from St. Louis to the mouth of the Mississippi River;

"and the said Board may consider in connection with the examination herein provided for, the survey of a proposed waterway from Chicago to St. Louis, heretofore reported. * * * What increase of depth will be obtained over the natural flow of water in such regulated channel by an added volume of ten thousand cubic feet per second; also fourteen thousand cubic feet per second." (Laws Improvement of Rivers & Harbors, Vol. 2, p. 1261; U. S. Stat. at large, Vol. 34, p. 1073.)

The Rivers and Harbors Act of June 25, 1910, appropriated a million dollars for the construction of a waterway from Lockport, the southern terminus of the Sanitary & Ship Canal, by way of the DesPlaines and Illinois River, to the mouth of the Illinois, and also provided that the Secretary of War should appoint a Board of five members, four of whom should be engineer officers of the army, and one an engineer from civil life. The duties of the Board were stated in the act as follows:

"Said Board shall report upon the feasibility of such waterway and the most advisable depth and dimensions therefor in case the same is recommended; also upon such measures as may be required to properly preserve the levels of the Great Lakes and to compensate, so far as practicable, for the diminished level in said lakes and the connecting waters thereof by reason of any diversion of water from Lake Michigan for the maintenance of the proposed waterway herein described, or diversion for any other purpose. And further, also, upon the influence on volume and height of water in the Mississippi River below Cairo". (Laws, Improvement of Rivers & Harbors, Vol. 2, p. 1420; U. S. Stat. at large, Vol. 36, p. 630.)

On June 30, 1917, a joint resolution was adopted by Congress, as follows:

> *"Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That public resolution numbered forty-five of the Sixty-fourth Congress, approved January 19, 1917, entitled 'Joint Resolution authorizing the Secretary of War to issue permits for additional diversion of water from the Niagara River,' is continued in full force and effect, and under the same conditions, restrictions and limitations, until July 1, 1918; *Provided,* That the Secretary of War is hereby authorized and directed to make a comprehensive and thorough investigation, including all necessary surveys and maps, *of the entire subject of water diversion from the Great Lakes and the Niagara River, including navigation, sanitary and power purposes,* and the preservation of the scenic beauty of Niagara Falls and the rapids of Niagara River, and to report to Congress thereon at the earliest practicable date. To carry out the provisions of this proviso there is hereby appropriated, out of any money in the Treasury not otherwise appropriated, the sum of $25,000." (U. S. Stat. at large, Vol. 40, p. 241.)

The reports of Boards of Engineers and Engineer Officers made pursuant to said Acts of Congress requiring same, assumed a diversion of 10,000 seconds feet at Chicago through appellant's works to be an existing fact, and recommended the location of a deep waterway along the Sanitary & Ship Canal, and the utilization of the said diversion through said Canal in connection with the improvement of the waterway below its southern terminus along the DesPlaines and Illinois Rivers to St. Louis.

The reports of the engineers as to the diversions of water from the Great Lakes, including the Board of Engineers for Rivers & Harbors, recommended the construction of compensating or regulating works in the St. Clair and Niagara Rivers to off-set for the diversions through the Sanitary & Ship Canal and at other places. No curtailment of diversions either for power and navigation purposes at Niagara Falls or through the Welland Canal or through appellant's canal for navigation and sanitary purposes, affecting lake surfaces, was recommended. Extracts from these reports will be found in Appellant's Narrative (p. 163).

REPORTS OF INTERNATIONAL WATERWAYS COMMISSION AND TREATY MADE PURSUANT TO RECOMMENDATIONS OF SAID COMMISSION, BETWEEN GREAT BRITAIN AND THE UNITED STATES SIGNED JANUARY 11, 1909, PROCLAIMED MAY 13, 1910, RELATING TO CANADIAN BOUNDARY WATERS.

The International Waterways Commission consisted of three members representing the United States, and three representing Canada. The Commission's duties and organization sprang from Section 4 of the Rivers and Harbors Act of June 13, 1902, above mentioned, and reciprocal legislation of the Canadian Government. Its duties generally involved the investigation of and reporting on all matters relating to the conditions and uses of boundary waters and waters adjacent thereto, and making recommendations as to a proposed treaty concerning such waters.

The International Waterways Commission made investigation of and reports upon the diversion of waters at Niagara Falls for water power purposes, and the division of such diversions between the United States and Canada. On May 3, 1906, report was made, signed by all the members of the Commission, the American as well as the Canadian members, recommending approximately 36,000 seconds feet diversion on the Candian side at Niagara Falls, and approximately 18,500 cubic seconds feet on the American side for power purposes. In reaching the amounts named and the division between the United States and Canada, the United States was charged with 10,000 cubic seconds feet diversion at Chicago by appellant, in addition to the 18,500 seconds feet at Niagara Falls. (Appellant's Narrative, p. 104.)

On January 4, 1907, the International Waterways Commission made a special report relating to appellant's diversion, entitled, "Report upon the Chicago Drainage Canal". This report reviewed the entire history of the construction

and operation of appellant's works, the proposed diversion of 4,000 cubic seconds feet through the Calumet Sag Channel and the Calumet River, in addition to that through the Sanitary & Ship Canal and the Chicago River. The Commission treated as an existing fact the diversion of 10,000 seconds feet, and considered that the only controversy which existed with reference to the amount of diversion by appellant, was that contemplated through the Calumet Sag Channel, namely the 4,000 cubic seconds feet maximum capacity. In referring to this matter, the report stated (Appellant's Narrative, p. 495):

> "Nor does it wish to re-open the case of the Chicago Drainage Canal as designed and built. It accepts that as a fixed fact with its attendant diversion of 10,000 cubic feet per second through the Chicago River. The extension of the system to the Calumet River alone is in question. * * * "

The Commission concluded:

> "The diversion of large bodies of water from Lake Michigan for supplying the drainage canal has not been authorized by Congress, but there appears to be a tacit general agreement that no objection will be made to the diversion of 10,000 cubic feet per second, as originally planned.
>
> * * *
>
> "The diversion of 10,000 cubic feet of water per second at Chicago will render practicable a waterway to the Mississippi River 14 feet deep. Any greater depth must be obtained by the abstraction of more water from Lake Michigan and at the expense of the navigation interests of the Great Lakes and of the St. Lawrence Valley."
>
> * * *

The Commission recommended:

> "* * * A careful consideration of all the circumstances leads us to the conclusion that the diversion of 10,000 cubic feet per second through the Chicago River will, with proper treatment of the sewage from areas now sparsely occupied, provide for all the population which will ever be tributary to that river, and that the amount named will therefore suffice for the sanitary purposes of

the city for all time. Incidentally it will provide for the largest navigable waterway from Lake Michigan to the Mississippi River which has been considered by Congress.

We therefore recommend that the Government of the United States prohibit the diversion of more than 10,000 cubic feet per second for the Chicago Drainage Canal."

* * *

Thereupon, a treaty was made and entered into between the United States and Great Britain, covering and following the subject matter of the recommendations of the International Waterways Commission. It was signed January 11, 1909, proclaimed May 13, 1910. (Appellant's Narrative, p. 529.)

The Treaty provided in the preliminary article that it was the intention

"to settle all questions which are now pending"

relating to the subject matter. Boundary waters were defined to be those

"from main shore to main shore of the lakes and rivers and the connecting waterways or the portions thereof, along which the international boundary * * * passes * * * but not including tributary waters which in their natural channels would flow into such lakes, rivers and waterways * * *"

Article 2 reserved to each of the parties

"or to the several State governments on the one side and the Dominion or Provincial Governments on the other, * * * the exclusive jurisdiction and control over the use and diversion * * * of all waters on its own side of the line which in their natural channels would flow across the boundary or into boundary waters."

Article 5 provided for diversion of 20,000 cubic feet of water per second at Niagara Falls on the American side for power purposes, and 36,000 cubic feet per second on the Canadian side.

Article 8 fixed the order of precedence of the uses of boundary waters to be.

"1. Uses for domestic and sanitary purposes.

2. Uses for navigation, including service of canals for the purposes of navigation.

3. Uses for power and for irrigation purposes." (Appellant's Narrative, p. 206.)

RESULTS AND EFFECT FROM HEALTH AND SANITARY STANDPOINT OF APPELLANT'S DIVERSION WORKS WITH THE ATTENDANT ABSTRACTION OF 10,000 CUBIC SECONDS FEET OF WATER FROM LAKE MICHIGAN.

The method of diverting sufficient water from Lake Michigan through the Chicago River, its branches, and the Sanitary & Ship Canal, to keep the Chicago River and its branches reversed (10,000 cubic seconds feet) was at the time the works were laid out and constructed, and is now, the only available method for the protection of the water supply.

The maximum run-off of the Chicago River drainage area is 10,000 cubic feet per second. In order to keep the Chicago River from flowing into Lake Michigan, carrying with it pollution to the water supply, it is necessary to divert from Lake Michigan an amount of water equal to this maximum run-off: (Appellant's Narrative: Fuller, p. 237; Phillips, p. 258; Stearns, p. 222; Wisner, p. 190; Cooley, p. 279.)

If the flow through the Sanitary & Ship Canal were reduced to 4,167 seconds feet, many times during each year in times of heavy rains, the Chicago River would flow into Lake Michigan. On account of the vast paved and sewered area, the water is delivered quickly to the Chicago River and its branches in from two to three hours. (Appellant's Narrative: Wisner, p. 390.) Tests were made on the drainage channel to ascertain how long it would take to change the flow from 4,167 second feet to 10,000 second feet. These tests showed that it would require approximately twenty-four hours to make such change, so that it would be impossible to so operate the Sanitary & Ship Canal and its controlling works at its southern terminus to anticipate the effect of heavy rains upon the water supply with the diversion reduced to 4,167 seconds feet, or any amount materially less than 10,000 seconds feet. (Appellant's Narrative: Wisner, p. 390.)

The cardinal principle, underlying proper protection of the water supply, is so arranging the works for the disposal of sewage and drainage that no sewage or drainage or effluent from artificial purification works may enter or come in contact with the water supply. (Appellant's Narrative: Cooley, p. 309; Wisner, p. 190; Phillips, p. 258; Stearns, p. 222.)

The Chicago River and its branches, before the Sanitary & Ship Canal was placed in operation, were filthy, dirty, sewage polluted waters, in septic condition, with gas bubbles rising, having large cakes of floating sewage mud. (Appellant's Narrative: Wisner, p. 189; Cooley, p. 291.)

The operation of the Sanitary & Ship Canal has absolutely remedied this condition so at the present time there is no local nuisance in the Chicago River, and the sewage does not get into the lake, polluting the water supply. (Appellant's Narrative: Wisner, p. 190; Cooley, p. 288.)

Prior to the opening of the Sanitary & Ship Canal, there were great epidemics of typhoid fever due to the polluted water supply, the death rate in such epidemics being as high as 170 per 100,000 people. (Appellant's Narrative: Cooley, p. 291.) For the 13 years prior to the opening of the Sanitary & Ship Canal, the annual death rate from typhoid fever was 52.6 per 100,000 population. For the 13 years after the opening of the canal, the annual death rate from typhoid fever was 19.9 per 100,000, a reduction of 68%. The reduction was greater in the latter period of 13 years than in any other American city, even where filtration plants had been installed. The rate for 1911 and 1912 was lower than the cities of Philadelphia, Washington, Pittsburg and New Orleans, where filtered water is supplied. The rate for those years is as low as in Boston, lower than San Francisco, where the water is obtained from carefully watched water sheds to prevent pollution. In the 13 years following the opening of the Sanitary & Ship Canal, diarrheal diseases were reduced 55%. (Appellant's Narrative: Wisner, p. 206.)

At page 323 of Appellant's Narrative, there is a chart showing death rate from typhoid fever in Chicago. There were no marked epidemics of typhoid fever at Chicago after the Sanitary & Ship Canal was opened. (Appellant's Narrative, p. 323.) The death rate from typhoid fever is a test of the health conditions of a city. Where one death from typhoid fever has been avoided by the use of pure water, a certain number of deaths, probably 2 or 3, from other causes have been avoided. This is known as Hazen's Law. (Appellant's Narrative: Adams, p. 326.) These facts are undisputed and no evidence was offered by appellee to the contrary.

HYDRAULIC EVIDENCE CONCERNING THE GREAT LAKES AND CLAIMED DAMAGE TO COMMERCE.

To what extent, if any, has or will the diversion of water from Lake Michigan at Chicago lower the levels of the Great Lakes and their outlets?

The Great Lakes occupy six depressions in the earth surface, and receive the drainage or run-off from a large area of adjacent land partly in Canada and partly in the United States, which run-off reaches them in major part by flowing over the surface in rivers and creeks. (Appellant's Narrative, p. 139.)

The precipitation varies in amount from month to month and year to year. On the Huron-Michigan drainage area, it varied from 38.63 inches in 1883 to 27.17 inches in 1895, a variation of about 42% from the minimum. (Appellant's Narrative, p. 139.) Evaporation takes place from the lake surfaces and from the ground and plant life. These two agencies, precipitation and evaporation, are the principal ones affecting the annual and monthly elevation of the Great Lakes, and are responsible for the major part of their fluctuations. (Appellant's Narrative, p. 139.)

The levels of the Great Lakes were actually higher during the ten years immediately following than during the ten years immediately preceding the opening of the Sanitary & Ship Canal. (Appellant's Narrative, p. 139.)

The diversion from the Great Lakes at Chicago through the Sanitary & Ship Canal, varied progressively from 4,300 cubic feet per second in 1900, to approximately 7,600 cubic feet per second in 1910. (Appellant's Narrative, p. 139.)

The waters involved are those of the entire lake system except Lake Superior and its tributaries, and except so much of the St. Mary's River as is above the foot of the Rapids at St. Ste. Marie.

The evidence of appellee as to the effect of the Chicago diversion upon the levels of the Great Lakes and their connecting waters, consisted entirely of the testimony of expert witnesses. (Appellant's Narrative, p. 127.) It related to the establishment of the increment of the St. Clair, Niagara and St. Lawrence Rivers. The increment of a river is the increase or decrease in its flow due to the rise or fall of one foot of the river's controlling lake.

Beginning with the year 1898, the United States Lake Survey had attempted to measure on numerous occasions the outflow of the discharge of the various outlet rivers. At the time when the determinations were made, hourly records had been kept of the stage of the different controlling lakes by automatic recording gauges. From these determinations, the discharge of the river at the time the velocity was obtained, could be calculated. The stage of the controlling lake at the time the discharge measurement was made, was then taken from the records of the recording gauge. The discharge measurements were plotted upon a paper according to the amount of the discharge and elevation of the lake at the time the discharge measurement was made. (Appellant's Narrative, p. 125.) As shown on Complainant's Exhibits 1 to 4, inclusive, a line is drawn through representing the mean of the measurements. (Appellant's Narrative, p. 125.) The difference between the discharge at a certain elevation and that at an elevation one foot higher, or one foot lower, was claimed to represent the increment. Thus, to determine the increment, it was necessary to do three things; *first*, to correctly measure the discharges of the rivers at the times made; *second*, to correctly determine what discharges are due to or correspond to the selected elevations; *third*, to correctly measure the difference in discharge between at least two elevations of the lake surface.

Having determined the increment, it was assumed that the lake was lowered by a diversion at Chicago equal to that fraction of a foot resulting from dividing the amount of the diversion by the increment of the outlet river as thus deter-

mined. (Appellant's Narrative, p. 127.) The greater the number of discharge measurements of the river whose increment it was sought to ascertain, and the greater the range of stage of the elevation of the controlling lake when the various discharge measurements were made, the more accurately would the increment of the outlet river be determined. (Appellant's Narrative, p. 145.) Thus errors in the discharge measurements of these great rivers and errors in the gauging of the surface elevations and in tying each discharge measurement to the proper elevation, would the more likely be eliminated. From a hydraulic standpoint, Michigan-Huron is treated as one lake, as their elevations are the same.

The witnesses for appellee concluded by means of these processes that the diversion through the Sanitary & Ship Canal of 10,000 to 14,000 cubic feet per second, was as follows:

Michigan-Huron 5. to approximately 6¾ inches.

Lake Erie, from 4 to 6 inches.

Lake Ontario, from 4 1/6 to 6 inches.

Lake Superior would not be affected. (Appellant's Narrative, p. 133.)

Appellant's expert testimony showed that the accuracy in determining the necessary data to ascertain the increment of the different outlet rivers, as above described, was not sufficiently perfect to enable the detection of a variation of flow of 10,000 cubic seconds feet, and thus the theoretical effect of the diversion through the Sanitary & Ship Canal could not be detected. (Appellant's Narrative, p. 140.)

The gauging sections of the different outlet rivers used in the measurements of the discharge to determine the increment, were several miles down the river from the respective controlling lakes. A discharge measurement was made at a certain time. It was then assumed that the stage of the lake at an estimated number of minutes before the time the discharge measurement was made, was the stage that con-

trolled the particular discharge at the time the measurement was made. (Appellant's Narrative, p. 145) The time interval estimate in tying the discharge measurement to the stage of the lake, or vice versa, was based upon certain assumptions made by some of appellee's witnesses, that the flow in the Sanitary & Ship Canal would be changed throughout from 4,167 seconds feet to 10,000 seconds feet in two to three hours from the time such change in flow was made at its southern terminus by lowering of the dams located there. This was found by actual tests to be entirely inaccurate, as it would take to accomplish this result not two to three hours, but at least twenty-four hours. (Appellant's Narrative, p. 390.)

Claimed damage to commerce.

It was not claimed by appellee that all vessels navigating the Great Lakes were or would be affected in their carrying capacity due to a lowering of the lakes surfaces, or that such lowering would affect any vessel at all places. It was claimed however, that there were certain critical points of navigation at which the depth of the water determined the depth to which large ore carrying vessels of the Pittsburg Steam Company could load; that these vessels, all built since the Sanitary & Ship Canal was opened, plied principally between points on Lake Superior and points on Lake Erie, thus passing through the locks at Sault Ste. Marie, St. Clair River, Lake St. Clair and the Detroit River. The locks at Sault Ste. Marie and places in the stretch of rivers and lake from Huron to Erie, were claimed to be critical points of navigation for these vessels. (Appellant's Narrative, p. 148.)

It was also claimed that these ore vessels carried about 81 to 100 tons for each inch of loaded draft; that based upon 25 trips per season, the vessels returning light, there would be loss of 11,150 tons per year; that assuming a freight rate of 55 cents per ton, a monetary loss would therefore exist of $6,000 per large vessel; that 72,000,000 tons of freight passed through the locks at Sault Ste. Marie during the year

1912, the greater part of which was carried in vessels of such size as to be affected by any loss of depth caused by the Chicago diversion. That therefore the loss to American vessels due to the diversion of 10,000 seconds feet, would be a million dollars per annum. (Appellant's Narrative, p. 149.)

Appellant claimed that the lowering of the lake surfaces of the small amount testified to by appellee's witnesses would not materially affect navigation; that these ore carrying boats could not load within such narrow limits; that the flow into each lake is constantly varying as is the discharge, affecting their levels; that there are also daily and hourly changes due to winds and barometric disturbances of from 6 inches to a number of feet (Appellant's Narrative, p. 150) and as is shown on plates attached to the report of the Board of Engineers, entitled "Waterway from Lockport, Illinois, to the mouth of the Illinois River," dated August 13, 1913, and made pursuant to the Rivers & Harbors Act of June 25, 1910, an extract from said report and a typical plate being shown in Appellant's Narrative (p. 150).

The unimportance of a few inches is shown by the failure of the appellee to remove a platform over the floor of the Poe Lock, which reduced the available depth of the Poe Lock approximately 0.33 of a foot, or about 4 inches. This condition existed from the time it was available for navigation in 1898 to 1913 when Mr. Ripley testified as to such condition. (Appellant's Narrative, p. 154.)

All boats claimed to be affected by the Chicago diversion, were built after the diversion began. (Appellant's Narrative, p. 159.)

The reference plane for the navigation improvement project of 1903, of the critical points of navigation between Lake Superior and Erie ports provided for by Congress, was fixed by the Engineer Corps six inches lower because of the diversion of 10,000 seconds feet at Chicago. (Appellant's Narrative, p. 155.) In other words, these critical points of navigation were dredged and deepened six inches lower than they

would have been had the Chicago diversion not existed, and navigation was thus protected from the claimed effects of the Chicago diversion.

Taking all the boats that could possibly be affected, namely 93 vessels of the 500 foot class, and 73 vessels of the 600 foot class, it was estimated that they could have been built longer without affecting their handling or cost of operation to carry an additional amount equal to the claimed loss of tonnage due to the smaller draft. The estimate for 3 inches less draft for all these boats in cost of constructing them in that manner, 93 of the 500 foot class and 73 of the 600 foot class, is $1,404,300 and $1,197,200, respectively. (Appellant's Narrative, p. 159.)

It is inaccurate to take the supposed loss or tonnage per inch and multiply it by the freight rate per ton to determine the monetary loss due to one inch less depth. There is only so much tonnage to carry by boats of the classes affected, and the loss is therefore represented by the extra cost of transporting the tonnage with the boats affected carrying the smaller cargo. (Appellant's Narrative, p. 159.)

Taking all these things into consideration, it is determined that the cost of transporting tonnage carried by the vessels of the 500 and 600 foot class for each inch loss of draft is 0.116 cents per ton. Calculating the number of trips for each vessel of the total affected—166—and the decrease in tonnage carried per year, the total capitalized loss which represents the entire loss for 3 inches loss in draft, is for 15 trips $1,848,600; for 20 trips $2,461,800; for 25 trips $3,076,200. The 166 vessels mentioned carried 37,000,000 tons of freight during the year 1912. On this basis, the loss per year for 3 inches loss in draft would be $128,760. Capitalizing this sum at 5%, is $2,575,200 as the total loss. (Appellant's Narrative, p. 159.)

The average number of trips of vessels loading beyond 18.1 feet passing through the locks of the Sault, is 14.12 per year, and this represents the 166 vessels mentioned. (Appellant's Narrative, p. 159.)

The cost of deepening the channels of the St. Mary's River, St. Clair River, channel in Lake St. Clair and those of the

Detroit River for 4 inches, is $163,990; 8 inches $403,854. The cost of deepening the harbors, including, also, the said channels, is 4 inches—$2,163,454; 8 inches—$4,405,008. The capitalized maintenance for 4 inches is $728,510; for 8 inches $1,092,766. (Appellant's Narrative, p. 160.)

A table was prepared showing the ports from and to which ore was carried and the amount for each port, during the fiscal year ending June 30, 1921; also a table was prepared showing the project depths as fixed by Congress up to the year 1922 for these various ports, including the critical points of navigation above mentioned—the St. Clair River and Livingston Channel in the Detroit River; also the table showed the actual depths of water for the low water years since the drainage channel was opened. This table shows that at no time was the actual depths of water at these ports and critical points of navigation, lower than the project depths as fixed by Congress. (Appellant's Narrative, pp. 161, 162.)

WORKS MAY BE CONSTRUCTED AT LITTLE COST TO OFFSET OR COMPENSATE FOR THE CLAIMED LOWERING OF THE ELEVATIONS OF THE LAKES, KNOWN AS COMPENSATING OR REGULATING WORKS.

It has long been established that submerged weirs or dams may be constructed and so placed in the outlet rivers such as St. Clair, Niagara and St. Lawrence Rivers, that the flowage capacity of these rivers will be contracted to an amount equal to the Chicago diversion of 10,000 or 14,000 cubic seconds feet. Thus the levels of the lakes would be restored and navigation would not be injured. (Appellant's Narrative, p. 164.)

These are called compensating works. Another kind of works effects the same purpose in a different way and are known as regulating works. They consist of movable dams placed in the outlet rivers so that at times the river may be more contracted than at others. These works are operated to maintain the levels of the controlling lake at an even stage; that is, the lake will not at the time of small supply reach the low stage that it would in natural conditions, nor will it reach as high a stage. The operation of the works would entirely off-set and take care of the diversion and give better navigation facilities. (Appellant's Narrative, p. 166.) For years works of this kind have been maintained and operated in the St. Mary's River and the stage of Superior has been controlled and the flow of the St. Mary's River regulated. (Appellant's Narrative, p. 176.) The International Waterways Commission and other Boards of Engineers have recommended the installation of such works. The Board of Engineers on Rivers & Harbors reporting under the above mentioned resolution of June 30, 1917, with reference to all diversions from the Great Lakes, recommended that regulating works be installed not only to take care of the effect of all diversions from the Great Lakes affecting the levels, including that of appellant, but also for the purpose of providing

better navigation facilities than would have existed under natural conditions. (Appellant's Narrative, p. 102.)

The Special Board of Engineers appointed under the Rivers & Harbors Act of June 25, 1910, made its report on August 15, 1913. This report was reviewed by the Board of Engineers for Rivers and Harbors in a report dated December 16, 1913, all of which was transmitted to Congress in the year 1914 (Appellant's Narrative, p. 176) known as H. R. 762, 63rd Congress, 2nd Session. The Special Board reporting, as stated, under date of August 15, 1913, found that

> "To restore the diminished levels in the lakes by constructing contracting works in their outlets, does not, however, present any serious difficulties";

also that

> "At the foot of Lake Ontario the closure of the Gut channel of the Galops Rapids by the Canadian Government has had the effect of raising the level of Lake Ontario an amount nearly equal to the computed lowering of the lake by a diversion of 10,000 second-feet at Chicago, and no compensation is at present deemed necessary to restore former conditions in this lake. (Appellant's Narrative, p. 176.)

Submerged weirs were recommended by the Board to be constructed in the Niagara River, also in the St. Clair River, to raise the levels of Erie and Michigan-Huron. (Appellant's Narrative, p. 176.)

In speaking of the works proposed to be constructed in the St. Clair River, the report stated:

> "It is computed that these weirs will increase the velocity of the water flowing over them slightly (from a mean of 3.28 feet to 3.89 feet per second) but, on the other hand, above the mouth of the Black River the river slopes, and velocities which are now excessive will be diminished *and navigation on the whole will be benefitted*".

The Board of Engineers for Rivers and Harbors, in reviewing the report of the Special Board above mentioned,

by its report of December 16, 1913, recommended (Appellant's Narrative, p. 171)

> "that the total volume of water to be diverted from the natural discharge channels of the lakes should be definitely fixed by Congress; that a project, with estimate of cost, for works necessary to compensation for such diversion, be prepared to the satisfaction of the Chief of Engineers and the Secretary of War; that before any diversion is made beyond that at present existing, the State of Illinois shall transfer to the Secretary of War the funds necessary for such works as given by the approved estimate of cost; that the works shall be built by the United States with the funds so provided, and that the control and maintenance of such works shall be in and at the cost of the United States".

The estimate of the cost of constructing the compensating works in the St. Clair and Niagara Rivers, as reported by the Special Board, was $475,000, and the annual cost of maintenance was $15,000. (Appellant's Narrative, p. 176.)

IF DIVERSION LIMITED TO 4,167 SECONDS FEET, ILL EFFECTS CANNOT BE OVERCOME.

In 1914 appellant made an estimate of the cost of constructing works that would be necessary if the diversion were limited to 4,167 seconds feet, and it was not permitted to divert the amount fixed according to the capacity of the Sanitary & Ship Canal, and the results of this investigation were produced in evidence that year. The sewer system of Chicago is what is called the combined system, that is, the sewers carry the sewage coming from the houses, buildings and factories and other places, as well as the storm and drainage water from the streets and ground surface. (Appellant's Narrative, p. 178.) These sewers principally and must necessarily discharge into the Chicago River or its branches (Appellant's Narrative, p. 179.) If the diversion is limited to 4,167 seconds feet, it would be necessary to artificially purify all sewage and let the effluent from these works discharge into the Chicago River, its branches and the Drainage Canal. The art of artificially purifying sewage has been in a state of change or flux—that is, one method would no sooner be adopted by engineers as the proper method to purify sewage, than it would be discarded for some other or newer method, which in turn would receive like treatment. (Appellant's Narrative, p. 257.) In the next place, it is impossible by artificial sewage purification works to completely produce an effluent from them that would not pollute the water supply if allowed to reach it. (Appellant's Narrative, p. 258.) With the diversion limited to 4,167 seconds feet, there would be many times during each year when the water of the Chicago River and its branches would flow into Lake Michigan, polluting the water supply. (Appellant's Narrative, p. 209.) No works could be constructed to purify the sewage arising in appellant's territorial limits, to take the place of the diversion required in excess of 4,167 second feet, without not only endangering the water supply, but also actually polluting it.

(Appellant's Narrative, p. 220.) It would take years to construct such works, even if the funds could be provided. As before stated, appellant made investigations of the cost of constructing works to supplement the diversion of 4,167 seconds feet and partially take the place of the additional diversion required. It is unnecessary to here state the details of such plans as they appear in the record and in appellant's narrative (p. 217). We will merely give the estimate of cost.

The estimated cost for the installation of such works, in 1914, including capitalized cost of operation, if the flow were limited to 4,167 seconds feet, was $183,000,000, assuming maximum 10,000 seconds feet; $220,000,000 assuming maximum 12,000 seconds feet, the present capacity of appellant's diversion works, and $257,000,000, assuming maximum 14,000 seconds feet, the total capacity of the Sanitary and Ship Canal in the rock section. The above estimates are based upon the assumption that there will be in a short time a population large enough to require the 12,000 and 14,000 cubic seconds feet to oxidize the sewage of this additional population. (Appellant's Narrative, 217.)

After the above mentioned facts and estimates were presented in the record, appellant submitted (April 25th and 26th, 1923), evidence showing that works to supplement the diversion of 10,000 cubic seconds feet, that is, to artificially purify the sewage and other wastes in excess of the population equivalent of three million people, would cost upwards of one hundred million dollars, and they could not be installed prior to the year 1945. (This Brief p. 79.)

OPINIONS OF THE DISTRICT COURT.

The case was submitted on the 15th of February, 1915, to District Judge Kenesaw Mountain Landis, upon printed record and printed briefs and argument, a brief of facts and a brief on the law being tendered by each party. All of the evidence mentioned hertofore, except the tables showing the carriage of ore for the year 1921 and the table showing the project depths in comparison with actual depths at low water times since the opening of the Drainage Channel and the reference to the report made under the resolution of June 30, 1917, as to the regulating works to off-set for diversions, was presented during the period beginning with the year 1908 and ending January, 1915. Certain other evidence was presented on the 25th and 26th of April, 1923, in connection with the motion made on July 12, 1920, about to be mentioned.

OPINION OF JUDGE LANDIS.

Judge Landis, having had the case under advisement from February 15, 1915, on June 20, 1920, rendered an oral opinion or direction for the preparation of a decree. This opinion was taken down in shorthand and transcribed, but never was signed by the Judge, and no other written memorandum signed by Judge Landis of his opinion exists. (Appellant's Narrative, p. 95.) In substance the Court found the issues with the appellee, and directed that a decree be prepared enjoining the appellant from abstracting water from Lake Michigan in excess of 4,167 seconds feet, as prayed by the complaint of October 6, 1913.

MOTION OF APPELLANT, FOLLOWING OPINION OF JUDGE LANDIS.

On July 12, 1920, appellant presented a motion that the Court

> "reconsider its oral opinion and oral direction heretofore announced concerning the form of decree to be entered in the said causes, and that the court direct that The Sanitary District of Chicago, defendant, be enjoined, only, from withdrawing or diverting from Lake Michigan, through its various works now constructed or under construction, more than ten thousand cubic feet of water per second from Lake Michigan on condition that if the Congress of the United States, or other competent governmental authority, provides for the construction of, in St. Clair, Niagara or St. Lawrence rivers, or in one or all of them, works to compensate for any diminishing levels of the Great Lakes and connecting waters, due to the diversion or withdrawal of ten thousand cubic feet of water per second from Lake Michigan by The Sanitary District of Chicago, then The Sanitary District of Chicago shall defray the expense and pay the cost of the construction and maintenance of any such works upon request therefor by the United States of America. In connection with said motion, and as a part thereof, the defendant hereby offers and agrees to defray the expense or pay to the United States upon demand the cost of the construction and maintenance of the works of the character above described in accordance with an ordinance of the Board of Trustees of The Sanitary District of Chicago passed and approved by said Board on the 8th day of July, A. D. 1920, a copy of which said ordinance is hereto attached and marked Exhibit 'A', a certified copy of which is here ready to be produced in court. In support of said motion, and as grounds therefor, the defendant alleges and shows the following:" (Appellant's Narrative, p. 98.)

Appellant also by said motion set up the various proceedings in the case and the issues, and alleged principally that it was an undisputed fact in the record that compensating works could be constructed to off-set for the supposed lowering of the lake surfaces and their connecting channels. The ordinance of the Board of Trustees of appellant offering to

defray the expense of constructing these compensating works was set forth by attaching a copy thereof as an exhibit to the motion. There were other facts set forth in the motion that are not here pertinent to be mentioned. The motion was partially heard by the Court on the 12th of July, 1920, and further hearing was postponed. Finally, on March 1, 1922, Judge Landis ceased to be a Judge of the District Court by reason of his resignation. Thereafter the motion was heard before Judge George A. Carpenter of said District Court.

Appellant desired and asked that Judge Carpenter, the successor judge, hear all questions involved in the case, as well as said motion, in view of the fact that there was no memorandum signed by Judge Landis showing his conclusions. There was nothing upon which the successor judge could act except the pleadings and evidence in the record. However, Judge Carpenter refused to go into the merits and heard only argument upon the motion, and thereafter, on July 18, 1923, entered a decree enjoining the appellant, according to the prayer of the bill. At the same time he rendered an opinion orally, which was thereafter signed by him. (Appellant's Narrative, p. 113.)

In connection with said motion, prior to the entry of the decree and prior to Judge Carpenter's rendering his opinion as aforesaid, appellant offered evidence showing that on August 7, 1919, in cooperation with the United States Engineer at Chicago, Colonel Judson, its Board of Trustees, by ordinance, adopted a program for the construction of artificial sewage disposal works to supplement a diversion of 10,000 cubic seconds feet of water from Lake Michigan whereby over a period of twenty-five years appellant should construct and place in operation progressively works, so that at the end of said period of twenty-five years, the sewage of the increase of population and trade wastes, would be taken care of by these supplementary works. (Appellant's Narrative, p. 110.)

It also appeared from this evidence that the trade wastes, including the stockyards and tanneries entering the San-

tary & Ship Canal from the sewers of Chicago, would require as much water to dilute it as would be necessary to take care of the sewage of a million and a half of people. The population of the Sanitary District within the territorial limits of appellant was then approximately 3 million people. Thus the human sewage and wastes had a population equivalent for dilution equal to that of almost 5 million people. The increase in waste and human sewage would give an equivalent by 1945 of approximately 7 million people. (Appellant's Narrative, p. 362.) The total cost of these works would be upwards of a hundred million dollars (Appellant's Narrative, p. 366.)

Using all the financial resources of the District from taxation and issuance of bonds, funds could not be provided to install the works to take care of the sewage and wastes undisposed of by 10,000 seconds feet diversion, so that the works could be completed prior to 1945. At that time there would still be required 10,000 seconds feet diversion to take care of the sewage and wastes not treated. (Appellant's Narrative, p. 368.)

Before the diversion could be reduced below 10,000 seconds feet, it would be necessary to install filtration plants to filter the water supply, because with the diversion limited to 4,167 second feet or any amount materially lower than 10,000 seconds feet, the water supply would at times be polluted by the Chicago River flowing into Lake Michigan, carrying with it sewage and wastes. Under no circumstances could danger of such condition taking place be permitted without the entire water supply being filtered. (Appellant's Narrative, p. 365.) Therefore, in the year 1945, when the artificial sewage disposal works are constructed to supplement the 10,000 seconds feet diversion, taking care of the increase and the overloading of the Sanitary & Ship Canal, it would be necessary to begin the construction of filter plants at a cost of approximately 200 million dollars. (Appellant's Narrative, p. 366.)

Appellant is not authorized to actually take water out of the lake and disseminate it by means of mains and other devices

to the consumer. This duty rests upon the cities and towns within its limits. The cost of filtration plants is estimated at about $100,000,000 and the annual operating cost is about $3,500,000. Whether these cities and towns can ever,—or, if able, when they can—build these filtration plants, does not appear. They were not before the court as defendants or otherwise. (Appellant's Narrative, pp. 366, 367.)

It appeared that if the diversion were immediately limited to 4,167 seconds feet, the Chicago River would immediately become a polluted stream and a public nuisance (Appellant's Narrative, p. 208.) At times of storm many times during each year it would flow into Lake Michigan, polluting the water supply, causing epidemics of typhoid fever and other water born diseases, creating a condition as bad as that which existed prior to the opening of the Sanitary & Ship Canal. In addition,the Drainage Canal itself would become a public nuisance, the DesPlaines and Illinois Rivers would likewise be a public menace, all fish life there would be destroyed by reason of the sewage exhausting the oxygen content of the water, and generally an intolerable condition would result. (Appellant's Narrative, p. 209.)

Opinion of Judge Carpenter.

On June 18, 1923, Judge Carpenter rendered an opinion on which various decrees and orders were entered.(Appellant's Narrative, p. 113.) The opinion stated that it overruled the motion made by appellant, July 12, 1920, for reconsideration of Judge Landis' direction for a decree. The opinion further stated:

> "The record shows that the Sanitary District of Chicago has expended in its work some hundreds of millions of dollars; and the evidence shows rather conclusively that no other system of disposing of the sewerage in the great district covered would work so well as that devised by the Sanitary District. The City of Chicago, since the Drainage District began to operate, has practically doubled in population. The district served by the Sanitary District holds more people than over forty states in

the Union. The rate of typhoid fever since the completion of the Drainage Canal has been reduced from seventy-five per hundred thousand to a negligible number.

The testimony of Government engineers shows that it would take from ten to twenty-five years for the Drainage District to erect sewerage treatment and disposal works to handle the sewerage within the Drainage District, if the flow of water was reduced from 10,000 to 4,167 cubic feet per second.

This matter is a subject which needs the consideration of thinking people, not only in the State of Illinois, but in the whole United States. The Treaty with Canada entered into some years ago seemed to contemplate an acquiescence on the part of the Canadian Government to the withdrawal of 10,000 cubic feet a second by the Drainage District. However that may be, the Secretary of War has not given his official consent. Whether the increased withdrawal should or should not be made is properly a political and not a legal question, in the absence of consent by the Secretary of War. The Legislature of the State of Illinois, the various civic bodies, the Association of Commerce, and senators and representatives should see to it that at the earliest possible moment the situation here is brought to the attention of Congress, so that by appropriate legislation the health and welfare of this great community may be safeguarded. I have no doubt that when the matter is properly presented it will be taken up by Congress and by the State Department, and some plan devised which will bring about adequate and the desired results.

It goes without saying that this Court will not issue an injunction to be effective forthwith. It cannot impose the conditions so strenuously urged by the attorneys for the Sanitary District. It is doubtful whethere the State of Illinois could authorize expenditures to be made in foreign states and foreign countries to restore the water levels.

On the testimony of the Government engineers the Court might, in the exercise of a sound discretion, delay the effectiveness of its injunction for from fifteen to twenty-five years to enable the Sanitary District or the State of Illinois to arrange for other means of disposing of the sewerage now handled by the Sanitary District.

Believing as I do that it is a matter for the immediate action of Congress, a decree may be prepared finding the facts as stated in the Bill and enjoining the defendant

from withdrawing from Lake Michigan in excess of 4,167 cubic feet a second; the decree, however, not to go into effect for six months."

Orders and Decree for Injunction.

On the same day, the opinion was rendered by Judge Carpenter June 18, 1923, an order was entered denying the said motion made by appellant on the 12th day of July, 1920, requesting that it be not enjoined or restrained from withdrawing from Lake Michigan less than 10,000 cubic seconds feet of water. (Appellant's Narrative, page 116.)

At the same time the following decree for injunction was entered:

"This cause came on to be further heard at this term, and was argued by counsel; and thereupon, upon consideration thereof, it was ordered, adjudged and decreed as follows, viz:

That the defendant, the Sanitary District of Chicago, its Board of Trustees, officers, agents, attorneys, representatives, employees and servants, and all other persons acting or claiming or assuming to act under its authority, be, and they hereby are, and each of them hereby is, enjoined from diverting or abstracting any waters from Lake Michigan over and above or in excess of 250,000 cubic feet per minute.

The operation of this injunction is hereby stayed for a period of six months to enable the defendant to present the record herein to the Supreme Court of the United States." (Appellant's Narrative, page 117.)

Thereafter, on June 29, 1923, the appeal was allowed, assignment of errors was filed and an order was entered staying the injunction during the pendency of the appeal. (Appellant's Narrative, page 117.)

ERRORS UPON WHICH APPELLANT RELIES.

The injunctional decree was erroneous because (Appellant's Narrative, p. 118.)

(*a*) Plaintiff is not entitled to the injunction granted, and plaintiff's bill should have been dismissed. (Ass. 1.)

(*b*) Under the commerce clause of the Constitution, Article 1, Section 8, Clause 3, neither Congress nor any officer of the United States has power to regulate or limit the State of Illinois or The Sanitary District of Chicago in diverting water from Lake Michigan for public welfare in the exercise of the state's police power. (Ass. 2.)

(*c*) The Act of the General Assembly of Illinois of May 29, 1889, under which The Sanitary District was organized, expressly directs defendant to divert and abstract 20,000 cubic feet of water per minute for each 100,000 population of the district, such population being approximately 3,000,000 people. (Ass. 3, 4, 5, 6, 7)

(*d*) Said Act of May 29, 1889, of the General Assembly of Illinois, was passed for the sole and only purpose of preserving health and protecting life under the state's police power, and neither Congress nor any officer of the United States can interfere with the reasonable exercise of such police power. (Ass. 8.)

(*e*) The Act of May 29, 1889, of the General Assembly of Illinois and the construction and operation of the works provided to be built thereunder, cannot be interfered with by the United States, when the primary and sole purpose of such legislation and operation of said works is for public health and welfare of the people of the state and the impairment of navigation, if any, is only the indirect result of the operation of said Act of the General Assembly of Illinois and the works constructed thereunder. (Ass. 9.)

NOTE: We will not here state the assignment of errors with particularity or detail, but will set forth merely the substance.

(*f*) The pure, wholesome, potable drinking water supply for the people of Chicago, its environs and those within the territorial limits of the defendant, the disposal of the sewage of said people, and the diversion of same from the water supply, can only be obtained through the operation and maintenance of defendant's diversion works constructed under said Act of the General Assembly of Illinois of May 29, 1889, requiring a diversion of 20,000 cubic feet of water per minute for each 100,000 of population (population now upwards of 3,000,000 people.) (Ass. 10, 11, 12, 13 and 14.)

(*g*) With the diversion limited to 250,000 cubic feet of water per minute, as required by said injunction, works to artificially dispose of sewage supplementary to said diversion and works to filter the water supply of the people, cannot be constructed within a period of less than twenty years, by reason of the inability of the Sanitary District, defendant, to raise funds therefor by taxation and by the issuance of bonds. (Ass. 15, 16, and 17)

(*h*) The Act of Congress of March 2, 1827, entitled "An Act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan", authorized the State of Illinois to build the main channel of the defendant, Sanitary District, supplementary to or in place of the old Illinois Michigan Canal constructed in 1848, and to divert from Lake Michigan for said main channel at least 600,000 cubic seconds feet of water per minute and in excess of 250,000 cubic feet per minute fixed by said injunctional order. (Ass. 18, 19, 20, 21 and 22)

(*i*) The United States had full and complete knowledge of the passage of the Act of May 29, 1889, providing for the construction of the main channel of the Sanitary District with its attendant diversion, the progress of construction, completion, and the purpose of such works and invited and acquiesced in said diversion provided by said Act of May 29, 1889, and is estopped to interfere with it. (Ass. 23)

(*j*) Congress has by various acts fixed the project depths of all harbors and connecting waters of Lake Superior, Michigan, Huron, Erie and Ontario, and the actual depths of water in such harbors and connecting waters has not been less than the project depths fixed, notwithstanding defendant's diversion. (Ass. 24 and 25)

(*k*) The cost and financial burden resulting to the defendant by virtue of the said injunction and the limitation of said diversion is great, amounting to upwards of $250,000,000 and the damage to plaintiff by reason of the alleged injury to navigation is slight, and all claimed damages to navigation may be offset or compensated for by construction of compensating works, which cost would not exceed $475,000. (Ass. 26-28)

(*l*) The offer of defendant to pay the cost of constructing and maintaining compensating works to offset for the alleged lowering of the surface elevation of the Great Lakes system, on condition that the decree to be entered should only enjoin defendant from diverting in excess of 10,000 cubic feet of water from Lake Michigan, should have been accepted by the Court and a decree entered as requested by the defendant upon the condition that defendant comply with such offer. (Ass. 29-30)

(*m*) Congress has by various acts appropriated money for and required surveys and reports for a waterway from Chicago to the Gulf of Mexico, whereby the diversion of water by the defendant to the amount of 600,000 cubic feet per minute would be utilized and has by various acts also required surveys as to the means of offsetting or compensating for the lowering of the surface elevations of the Great Lakes system by said diversion, and has thereby indicated that it treated the said diversion by the defendant as existing, and did not intend to disturb it. (Ass. 31-32)

(*n*) Act of Congress of June 29, 1906, relating to the diversion of water from the Niagara River, known as the Act for the Preservation of Niagara Falls, expressly prohibits

interference with diversions from the Great Lakes for sanitary or domestic purposes except as Congress might in the future provide. (Ass. 33)

(*o*) The works of the Sanitary District were commenced prior to the passage of the Rivers and Harbors Act of September 19, 1890, and such works are recognized by said act as authorized by law. (Ass. 34)

(*p*) Sections 9 and 10 of the Rivers and Harbors Act of March 3, 1899, do not authorize the Chief of Engineers or the Secretary of War in any manner to supervise or regulate or control the diversion of water by the defendant. (Ass. 35-36-37)

(*q*) Permit of May 8, 1899, authorized the Sanitary District to open its main channel and was without limitation as to amount except the capacity of the main channel of the Sanitary District as fixed by law. This permit was subject to a condition only as to limitation of flow—that if the current should be unreasonably obstructive to navigation in the Chicago River, the Secretary of War might modify the discharge from Lake Michigan through the river. Thereafter, due to the then shallowness and narrowness of the Chicago River, its South Branch and West Fork, the Secretary of War ordered the flow limited to 250,000 cubic feet per minute. Because of such limitation for the purpose of providing for the greater flow of 10,000 cubic seconds feet, the Sanitary District, with the consent and approval of the Secretary of War, widened and deepened the channels of said rivers at a cost of approximately $13,000,000 so that there could be withdrawn through said river channels the amount of water required by said Act of May 29, 1889, without injury to navigation. Thereafter the Secretary of War or other officer of the United States was without authority to enforce the order limiting the withdrawal to 250,000 cubic feet per minute, made because of the then narrowness and shallowness of the channels of said rivers. (Ass. 38-39-40-41)

(*r*) The abstraction and withdrawal of water from Lake Michigan by defendant to the amount of 600,000 cubic feet of water per minute, or 10,000 per second, has not and will not impair the navigable capacity of any of the navigable waters of the United States, such impairment has not been observed by any lay witnesses, navigator or captain of any ship, or any one engaged in navigation. Such claim is only the result of the analyses of expert witnesses. (Ass. 41-42-43-44-45-46-47-48-49.)

(*s*) Defendant cannot observe the injunctional decree without causing pollution of the water supply of upwards of three million people within defendant's limits, from which would result epidemics of typhoid fever and other water-born diseases. (Ass. 50-51)

(*t*) Injunctional decree herein holds unconstitutional the Act of General Assembly of Illinois of May 29, 1889, under which the Sanitary District, the defendant, was organized. (Ass. 52)

(*u*) Treaty between the United States and Great Britain of January 11, 1909, concerning Canadian boundary waters, recognizes the diversion by the defendant to the amount of 10,000 cubic feet of water per second and precludes an injunction herein as to any diversion of 10,000 cubic feet seconds or less. (Ass. 53-54-55)

(*v*) It does not appear from the evidence that the diversion proposed by the defendant pursuant to said Act of May 29, 1889, under all the facts and circumstances, has obstructed or would unreasonably obstruct navigation. (Ass. 56-57 and 60)

(*w*) Decree herein enforces an arbitrary and unreasonable course pursued by the Secretary of War and the Attorney General. (Ass. 58)

(*x*) The Court should have balanced the equities and in so doing should have refused the injunction and dismissed the complainant's bill for want of equity. (Ass. 59)

(*y*) Congress will not be deemed to have acted concerning a matter of local regulation such as is embraced in the Act of the General Assembly of May 29, 1889, providing for defendant's diversion works, unless it has passed some special law with reference to the alleged obstruction. (Ass. 61)

BRIEF.

Appellant's Narrative 17, 21.

Sections 7 and 10, Rivers and Harbors Act, September 19, 1890.

Laws Improvement of Rivers and Harbors, Vol I, p. 582. U. S. Stat. at Large, Vol. 26, p. 426.

Sections 9, 10 and 12, Rivers and Harbors Act of March 3, 1899.

Laws Improvement of Rivers and Harbors, Vol. 2, p. 886.* U. S. Stat. at Large, Vol. 30, p. 1121.

I.

The diversion by appellant to the amount provided for under the Act of Illinois of May 29, 1889, under which appellant was organized and exists, has been "affirmatively authorized by law" (River and Harbors Act of September 19, 1890). Likewise, it has been "affirmatively authorized by Congress" (Rivers and Harbors Act of March 3, 1899).

(a) Appellant was organized under an Act of the General Assembly of Illinois passed in the exercise of the state's police power. This Act fixed appellant's powers and duties, and specified the required diversion of water from Lake Michigan.

Wilson v. *Board of Trustees,* 133 Ill. 443, 465.
People v. *Nelson,* 133 Ill. 565, 580, 582, 592, 594.
Beidler v. *The Sanitary District of Chicago,* 211 Ill. 628, 638.

*For convenience in referring to Rivers and Harbors Acts, we cite Document Number 1491, 62nd Congress, 3rd Session, entitled "Laws of the United States Relating to Improvement o.. Rivers and Harbors, August 11, 1790 to March 4, 1913." Sufficient copies have been furnished the Clerk.

Pittsburg, Fort Wayne & Chicago Railway Company v. *The Sanitary District of Chicago*, 218 Ill. 286, 287, 295.

Appellant's Narrative, p. 92.

United States v. *Bellingham Bay Boom Co.*, 176 U. S. 211.

(*b*) The diversion of water from Lake Michigan to operate the Sanitary & Ship Canal of appellant has been authorized by the Act of Congress of March 2, 1827. (Appellant's Narrative, p. 412.)

Appellant's Narrative, pp. 404, 405, 406, 410, 411, 408, 412.

Missouri v. *Illinois*, 200 U. S. 496, 519, 526.

Mortell v. *Clark*, 272 Ill. 201, 213.

Appellant's Narrative, p. 415.

Vol. 5, Messages and Papers of the Presidents, p. 3334.

Statement, p. 19.

Appellant's Narrative, pp. 448, 447.

Rec., Vol. IV, 2172.

(*c*) Appellee, through its engineer officers and the Secretary of War, observed the action of the State of Illinois and appellant pursuant to its authority in planning and constructing the diversion works. The Secretary of War consented to the work necessary to accomplish the diversion and authorized the opening of the main channel of the district. The Secretary of War construed the Congressional Act of March 2, 1827, and the laws of Illinois, as affirmatively authorizing the diversion.

Appellant's Narrative, pp. 451, 453, 464.

Statement, p. 48.

Appellant's Narrative, pp. 487, 454, 88, 474, 475, 23, 92, 90, 91.

(*d*) The Secretary of War, charged with the duty of enforcing the Rivers and Harbors Acts of September 19, 1890,

and March 3, 1899, has thus construed a diversion to the capacity of appellant's Sanitary and Ship Canal, to have been "affirmatively authorized by law" and "affirmatively authorized by Congress." These acts of the Secretary of War should have the force of judicial interpretation.

Hastings & Dakota Railroad Company v. *Whitney*, 132 U. S. 357, 366.

U. S. v. *Moore*, 95 U. S. 760, 763.

Shells Executors v. *Fauche*, 138 U. S. 562, 572.

Heath v. *Wallace*, 138 U. S. 573, 582.

II.

The permits of the Secretary of War of July 11, 1900, authorizing the work of deepening and widening the channels of the Chicago River to provide for the diversion or abstraction from Lake Michigan through them of the amount of water required by the state law according to the population of appellant, constituted all the authority required by appellant from appellee, to divert said waters.

Appellant's Narrative, p. 28.

Maine Water Company v. *Knickerbocker Steam Towage Company*, 99 Maine 473.

Sections 7 and 10, Rivers and Harbors Act of September 19, 1890. (Argument p. 106.)

Sections 9, 10 and 12, Rivers and Harbors Act of March 3, 1899. (Argument, p. 116.)

Maine Water Company v. *Knickerbocker Steam Towage Company, supra*, p. 477.

The altering or modifying of the navigable capacity of the waters, not only of the Chicago River and its branches, but of Lakes Huron, Michigan, Erie, Ontario, their connecting waters, and other navigable waters of the United States, by the diversion of water provided for through appellant's works, was thus authorized and is lawful.

Cummings v. *Chicago*, 188 U. S. 410.

Hubbard v. *Fort*, 188 Fed. 987.

Maine Water Company v. *Knickerbocker Steam Towage Company, supra.*

Hudson County Water Company v. *McCarter*, 209 U. S. 349.

III.

In any event, the Secretary of War has authorized the opening of appellant's Sanitary & Ship Canal, its operation and attendant diversion of water from Lake Michigan by the permit of May 8, 1899, every condition of which has been fulfilled, assuming such conditions to be valid. The Secretary of War was only authorized to grant or refuse a permit. He had no power to regulate the diversion of water at Chicago. The Attorney General had no authority to institute the suit for injunction.

(*a*) The effect of the May 8, 1899 permit and attempted limitation thereon.

Appellant's Narrative, pp. 90, 91, 23, 26, 202, 194, 2, 12, 526.

Statement, p. 51.

Monongahela Bridge Co. v. *U. S.*, 216 U. S. 177, 195.

Philadelphia Company v. *Stimson*, 223 U. S. 605.

Kwock Jan Fat v. *Edward White, as Commissioner of Immigration*, 253 U. S. 454, 464.

(*b*) The Attorney General under the Act of March 3, 1899, is only authorized to institute suits in equity for the removal of structures. The District Court was without jurisdiction to entertain this suit or enter the decree.

Appellant's Narrative, p. 21.

Laws, Improvement of Rivers and Harbors, Vol. 2, p. 887. (Argument p. 106.)

Laws, Improvement of Rivers and Harbors, Vol. 1, p. 583. (Argument p. 106.)

Section 12, Act of March 3, 1899. (Argument p. 106.)

Ogden City v. *Boreman*, 20 Utah 98; 57 Pac. 843.

Endlich on Interpretation of Statutes, Sec. 51.

Sutherland Statutory Construction, Sec. 140.

U. S. v. *Rio Grande Dam & Irrigation Company*, 174 U. S. 690.

(*c*) The Secretary of War is only authorized to grant or refuse a permit. He has no power to regulate the diversion.

IV.

Regardless of the effect of the Act of Congress of March 2, 1827, providing for the construction of the Illinois and Michigan Canal across the continental divide, and the interpretation of Section 10 of the Act of March 3, 1899, as heretofore stated, nevertheless, the Illinois Act of May 29, 1889, under which appellant has built and is operating its diversion works, is valid and enforceable, pursuant to the police power reserved to the states under the Constitution. The diversion by appellant to the amount necessary for the operation of its works is lawful without express consent of the Secretary of War. Any other construction of the Act of March 3, 1899, would tend to nullify appellant's acts in the interest of public health. This result cannot obtain unless such congressional intention is expressed in plain and unmistakable terms.

(*a*) The Illinois Act of May 29, 1889, under which appellant was organized and exists, was sufficient legislative authority for the construction of appellant's various diversion works and for the diversion of water from Lake Michigan as required by such works.

Cummings v. *Chicago*, 188 U. S. 410, 427, 428, 430.

Montgomery v. *Portland*, 190 U. S. 89, 107.

Corrigan Transit Company v. *The Sanitary District of Chicago*, 137 Fed. 851, 856 (C. C. A. 7th Circuit.)

Canada Atlantic Transit Company v. *Chicago*, 210 Fed. 7, 10, 11, (C. C. A. 7th Circuit).

Laurel Hill Cemetery v. *San Francisco*, 216 U. S. 358.

Escanaba L. M. Transportation Company v. *Chicago*, 107 U. S. 678.

Lake Shore & Michigan Southern Railroad Company v. *Ohio*, 165 U. S. 365.

Cardwell v. *American River Bridge Company*, 113 U. S. 205.

Huse v. *Glover*, 119 U. S. 543.

Willamette Iron Bridge Company v. *Hatch*, 125 U. S. 1.

The creation of appellant's Sanitary & Ship Canal and its other diversion works, was "authorized by law" under the Rivers and Harbors Act of September 19, 1890.

United States v. *Bellingham Bay Boom Co.*, 176 U. S. 211.

(*b*) The diversion by appellant to the amount necessary for the operation of its works, is lawful without the express consent of the Secretary of War. Any other construction of the Act of March 3, 1899, would tend to nullify appellant's acts in the interest of public health. This result cannot obtain unless such congressional intention is expressed in plain and unmistakable terms.

Columbus v. *Mercantile Trust Co.*, 218 U. S. 645, 658.

Missouri v. *Kansas Natural Gas Co.*, 68 L. Ed. Advance Sheets p. 585, June 16, 1924.

Public Utilities Commission v. *Landon*, 249 U. S. 236.

Pennsylvania Gas Co. v. *Public Service Commission*, 252 U. S. 23.

Missouri v. *Kansas Natural Gas Co.*, *supra*, p. 587.

Texas v. *White*, 7 Wall. 700, 725.

New York v. *Miln*, 11 Peters 102, 139.

Minnesota Rate Cases, 230 U. S. 352, 402.

Lake Shore & Michigan Southern v. *Ohio*, 173 U. S. 285.

Hennington v. *Georgia*, 163 U. S. 299, 317.

Crossman v. *Lurman*, 192 U. S. 189.

Plumley v. *Massachusetts*, 155 U. S. 461.

In re Rahrer, 140 U. S. 545, 554.

Mutual Loan Co. v. *Martell*, 222 U. S. 225, 233.

Cummings v. *Chicago*, 188 U. S. 410, 430.

Savage v. *Jones*, 225 U. S. 501.

Missouri, Kansas & Texas Ry. Co. v. *Haber*, 169 U. S. 613, 623.
Reid v. *Colorado*, 187 U. S. 137, 148.
Sinnott v. *Davenport*, 22 How. 227, 243.
Missouri Pacific R. R. Co. v. *Larabee Flour Mills Co.*, 211 U. S. 612, 623.
Missouri, Kansas & Texas R. R. Co. v. *Harris*, 234 U. S. 412, 418.
Carey v. *State of South Dakota*, 250 U. S. 118, 122.
Houston, East & West Texas Ry. Co. v. *U. S.*, 234 U. S. 342.
Illinois Central R. R. Co. v. *Public Utilities Commission*, 245 U. S. 493, 510.
Sligh v. *Kirkwood*, 237 U. S. 52, 60.
Hammer v. *Dagenhart*, 247 U. S. 251, 273, 275, 276.
Bailey v. *Drexel Furniture Co.*, 259 U. S. 20, 37.

(*c*) Congress has otherwise by legislation indicated that it was not its intention to prohibit the operation of appellant's diversion works, or that any act of any of its officers should have that effect.

Statement, pp. 48, 49, 49.
United States v. *Chandler-Dunbar W. P. Co.*, 229 U. S. 51.
Statement, pp. 49, 50, 50.
Appellant's Narrative, p. 505.
Statement, pp. 51, 51, 53, 55, 71.
Appellant's Narrative, p. 102.
International Bridge Company v. *People of State of New York*, 254 U. S. 126, 131.
West Chicago Street Railroad v. *People of Illinois*, 201 U. S. 505, 527.

V.

Appellee has invited and acquiesced in the construction by appellant of its Sanitary & Ship Canal to divert water from Lake Michigan to the amount represented by the capacity of said canal. It is estopped now to deny the right.

Statement, pp. 19, 34.

Missouri v. *Illinois*, 200 U. S. 496, 526.

United States v. *Pensylvania & Lake Erie Dock Company*, 272 Fed. 839, 848 (C. C. A. 6th Circuit).

United States v. *Board of Commissioners of Osage County*, 254 Fed. 570, 573.

United States v. *Debell*, 227 Fed. 775, 779 (C. C. A., 8th Circuit).

United States v. *Midway Northern Oil Company*, 232 Fed. 619, 631.

United States v. *Chandler-Dunbar W. P. Co.*, 152 Fed. 41, 81.

Monongahela Navigation Company v. *United States*, 148 U. S. 312, 334.

Hemmer v. *United States*, 204 Fed. 898, 901 (8th C. C. A.)

State of Iowa v. *Carr*, 191 Fed. 257, 266 (8th C. C. A.)

Appellant's Narrative, pp. 155, 162.

The force and effect of the treaty between the United States and Great Britain of January 11, 1909, relating to Canadian boundary waters and the reports of the International Waterways Commission recommending its terms.

Appellant's Narative, pp. 104, 505, 531, 532, 535, 522.

Schooner Exchange v. *McFaddon*, 7 Cranch, 116, 136.

See also opinion of Judson Harmon on right of United States in Rio Grande, 21 Opin. Atty. Gen. 274, 280.

VI.

The decree of the lower court is based solely upon the testimony of expert witnesses. No witness was produced by appellee to testify that the lowering of the lake surfaces or damage to commerce, was ever actually observed. Appellee's case depends entirely upon an inference of the unseen and the subtle analyses of expert witnesses, which cannot form the basis of an injunctional decree.

(*a*) Expert evidence in injunction cases.

Statement, p. 64.

Appellant's Narrative, pp. 125, 150.

Missouri v. *Illinois*, 200 U. S. 496, 523.

Joyce on Nuisances, 1906 Ed., Sec. 299, Sec. 420.

Salvin v. *North Brancepeth Coal Company*, L. R. 9, Chanc. Appeals, 705, 709.

North Dakota v. *Minnesota*, 68 Law Ed. 159 (Advance sheets, January 1, 1924).

(*b*) Disregarding all questions heretofore presented as to the right of appellant to operate its works with the diversion required, nevertheless the injunction decree should not have been entered unless the injury and damage to commerce was material and the obstruction to navigation was unreasonable.

United States v. *Rio Grande Irrigation Company*, 174 U. S. 690, 709.

Corrigan Transit Company v. *Sanitary District*, 137 Fed. 851, 857. (C. C. A. 7th Circuit.)

Lake Shore & Michigan Southern Railway Company v. *Ohio*, 173 U. S. 285, 294.

Cummings v. *Chicago*, 188 U. S. 410, 428.

Union Bridge Company v. *U. S.*, 204 U. S. 364, 365, 385, 400.

(*c*) It must appear in a case of this character, considering the parties involved, that an unreasonable obstruction and damage to commerce clearly exist.

New York v. *State of New Jersey & Passaic Valley Sewage Commissioners*, 256 U. S. 296, 309.

Kansas v. *Colorado*, 206 U. S. 46, 117.

Attorney General v. *Mayor, Alderman and Corporation of Kingston-on-Thames*, 13th Weekly Reporter, 1863-1865, 888.

Mississippi & Missouri R. R. Co. v. *Ward*, 2 Black 485, 495.

2 Story, Com. on Eq., 203, 204.

VII.

A court of equity in determining whether or not it will grant an injunction looks not only to the naked legal rights of the complainant and the advantages to be by it gained, but also to the inconveniences and injuries to be sustained by the defendant. And if it appears that the granting of the injunction would cause comparatively greater injury to the defendant than it would cause benefit to the complainant, a court of equity will not hesitate to deny the relief.

Appellant's Narrative, p. 217.

Vol. 1, Joyce on Injunctions, Sec. 20, p. 41, Sec. 25, p. 50.

Kansas v. *Colorado*, 206 U. S. 46, 117.

Georgia v. *Tennessee Copper Co.*, 206 U. S. 230, 237.

Dun v. *Lumbermen's Credit Assn.*, 209 U. S. 20.

McCarthy v. *Bunker Hill, Sullivan Mining & Concentrating Co.*, 164 Fed. 927, 940 (C. C. A. 9th Circuit).

City of New York v. *Pine*, 185 U. S. 93, 97.

VIII.

The statement made by the Secretary of War (January 8, 1913) in refusing to remove the alleged limitation by the order of December 5, 1901 (4,167 seconds feet withdrawal) and denying express authority of appellant to divert 10,000 cubic seconds feet, is immaterial. The statute does not authorize any findings or conclusions by the Secretary of War. If it did, the conclusions would be subject to review. In any event, the conclusions of fact and of law stated, are erroneous, as appears by the record of this case.

(*a*) The statute does not authorize the Secretary to make any findings or conclusions. If it did, such would be subject to review.

Philadelphia Company v. *Stimson*, 223 U. S. 605, 620.

Hardin v. *Jordan*, 140 U. S. 371.

Rosenberger v. *Harris*, 136 Fed. 1001, 1002.

United States v. *United Verde Copper Company*, 196 U. S. 207, 215.

School of Magnetic Healing v. *McAnnulty*, 187 U. S. 94, 110.

(*b*) In any event, Secretary of War Stimson's findings and conclusions were erroneous.

Appellant's Narrative, p. 28.

Corrigan Transit Company v. *Sanitary District*, 137 Fed. 851, 855, (C. C. A. 7th Circuit).

Appellant's Narrative, p. 29.

Mortell v. *Clark*, 272 Ill. 201.

This Brief, p. 120.

Appellant's Narrative, p. 176.

United States v. *Rio Grande Irrigation Company*, 174 U. S. 690.

IX.

The lower court should have granted the motion of July 12, 1920, by appellant, following the opinion of Judge Landis and his direction as to the drafting of a decree, that the appellant be only enjoined from taking in excess of 10,000 cubic seconds feet of water from Lake Michigan on condition that appellant pay the cost of constructing such compensating or regulating works as the United States should provide to be built to offset for the claimed lowering of the lake surfaces and their connecting channels due to 10,000 seconds feet diversion at Chicago. Admitting, for the sake of argument, only, all contentions of appellee to be true, appellant cannot be enjoined from taking an amount of water materially less than 10,000 cubic seconds feet from Lake Michigan, until appellant and cities and towns within its limits can, if at all, readjust their works of sewage disposal and of purification of water supply to suit the changed conditions.

(*a*) By granting the motion of appellant above mentioned, July 12, 1920, the lower court would have done equity. The construction of compensating or regulating works was entirely feasible, as the undisputed facts of the record show.

Appellant's Narrative, p. 111.
Statement, pp. 77, 71.
This Brief, p. 78.
Rec., Vol. IV, 2387.
Appellant's Narrative, p. 102.
Appellant's Narrative, pp. 100, 101, 111, 532.
Myers v. *Block*, 120 U. S. 206, 214.
Russell v. *Farley*, 105 U. S. 433, 438, 445.
Marine Ins. Company v. *Hodgson*, 7 Cranch, 332, 337.
Veazie v. *Williams*, 8 Howard 134, 161.
Walden v. *Bodley*, 14 Peters 156, 164.
Newton v. *Consolidated Gas Co.*, 258 U. S. 165, 177.

Northern Pacific Railway Company v. *U. S.*, 104 Fed. 691, 695 (C. C. A., 8th Circuit).

Sanitary District of Chicago v. *Martin*, 227 Ill. 260, 268.

Cushman v. *Bonfield*, 139 Ill. 219.

Phillips v. *Thomson*, 1 Johnson Chan. 133.

2 Sutherland on Damages, 590.

Story's Equity Jurisprudence, 798.

(*b*) Assuming that appellee is legally entitled at some time to an injunction, a decree, providing for the reduction of the diversion below to 10,000 cubic seconds feet before appellant and the cities, villages and towns within its limits can readjust their works of sewage disposal or of purifying the water supply, is contrary to equitable principles.

Appellant's Narrative, pp. 339, 362, 382, 366, 368.

Pomeroy's Equity Jurisprudence, (Vol. 5, Sec. 1948, p. 4429).

United States v. *Luce*, 141 Fed. 385, 422.

Peck v. *Newberg Light, Heat & Power Company*, (Supreme Court, App. Div., 2d Dept.) 116 N. Y. Supp. 433, 436.

Sammons v. *City of Gloversville*, 67 N. E. 622; 175 N. Y. 346.

Appellant's Narrative, p. 97.

Appellant's Narrative, p. 115.

(*c*) The decree of injunction in the court below absolutely enjoined appellant from withdrawing from Lake Michigan in excess of 4,167 seconds feet without any condition. The Secretary of War would be powerless under this decree to permit or authorize any further diversion. This condition should have been observed.

Appellant's Narrative, pp. 339, 344.

Transportation Act of 1920, 41 Statutes at Large, 456.

(*d*) This matter should be settled by Congress.

New York v. *New Jersey and Passaic Valley Sewage Commissioners*, 256 U. S. 296, 313.
Virginia v. *West Virginia*, 246 U. S. 565.
Amer. Bar Assn. Journal, February, 1922.
Rec., Vol. VIII, pp. 77-82.

CONCLUSION.

ARGUMENT.

The complaint upon which the relief was sought here and upon which the decree was entered, was filed October 6, 1913. (Appellant's Narrative, p. 17.) The relief was asked under Section 10 of the Rivers and Harbors Act of March 3, 1899. (This Brief, p. 106.) The complaint alleges the issuance of the permit of May 8, 1899, by the Secretary of War for the opening of the channel, subject to the conditions:

(1) If Congress should act, the permit should be of no force or effect;

(2) If the current should prove unreasonably obstructive to navigation in the Chicago River, the Secretary of War might cut off the discharge or modify it.

(3) Appellant should be responsible for damages. (Appellant's Narrative, p. 21.)

The complaint also alleges various orders of the Secretary of War, beginning April 9, 1901, purporting to modify the discharge through the Chicago River because of objections of navigation interests to the current in that river. One of said orders is the one of the Secretary of War of the 5th of December, 1901, seeking to limit the discharge through the channel from Lake Michigan to 250,000 cubic feet per minute, or 4,167 per second; and it is alleged that the Secretary of War had never authorized an increase of withdrawal from Lake Michigan over that amount; that appellant has been and is withdrawing, and proposes further to withdraw from Lake Michigan much in excess of that amount, and, in fact, the amount fixed by its organic act—20,000 cubic feet per minute for each 100,000 of its population; that the withdrawal of this water injures the navigable capacity of Lakes Michigan, Huron, St. Clair, Erie, Ontario and their connecting

channels, navigable waters of the United States, and thereby commerce on the Great Lakes is damaged. The complaint asks an injunction against appellant's diverting more than 250,000 cubic feet per minute, the alleged limitation of the order of the Secretary of War of December 5, 1901.

Appellee's position, therefore, is based upon the validity of the action of the Secretary of War in fixing the limitation mentioned—4,167 cubic seconds feet of withdrawal.

As shown by the statement of facts, these works were constructed under the Act of May 29, 1889, of the General Assembly of Illinois, and were commenced immediately thereafter and before the Rivers and Harbors Act of September 19, 1890, was passed. The Sanitary & Ship Canal, the main diversion channel of appellant, was completed in 1898, and prior to the passage of said Rivers and Harbors Act of March 3, 1899. It was not, however, placed in operation until afterwards.

Sections 7 and 10 of the Rivers and Harbors Act of September 19, 1890, and Sections 9, 10 and 12 of the Rivers and Harbors Act of March 3, 1899, in most respects, are similar. As it will be necessary to construe the effect of these various sections, we will here, at the outset, set forth the above mentioned sections in juxtaposition.

Sections 7 and 10, Rivers and Harbors Act of September 19, 1890 (Laws, Improvement of Rivers & Harbors, Vol. I, p. 582)—

"*Sec.* 7. That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty, or structure of any kind outside established harbor-lines, or in any navigable waters of the United States where no harbor-lines are or may be established, without the permission of the Secretary

Sections 9, 10 and 12, Rivers and Harbors Act of March 3, 1899 (Laws, Improvement of Rivers & Harbors, Vol. 2, p. 886)—

"*Sec.* 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been ob-

of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters, and it shall not be lawful hereafter to commence the construction of any bridge, bridgedraw, bridge piers and abutments, causeway or other works over or in any port, road, roadstead, haven, harbor, navigable river, or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works have been submitted to and approved by the Secretary of War, or to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War; *Provided*, that this section shall not apply to any bridge, bridge-draw, bridge piers and abutments and construction of which has been heretofore duly authorized by law, or be so construed as to authorize the construction of any bridge, draw bridge, bridge piers and abutments, or other works, under an act of the legislature of any State, over or in any stream, port, roadstead, tained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretry of War: *Provided*, That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced. *And provided further*, that when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War."

haven or harbor, or other navigable water not wholly within the limits of such State."

"*Sec.* 10. That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction, is hereby prohibited. The continuance of any such obstruction, except bridges, piers, docks and wharves, and similar structures erected for business purposes, whether heretofore or hereafter created, shall constitute an offense and each week's continuance of any such obstruction shall be deemed a separate offense.

"*Sec.* 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

Every person and every corporation which shall be

"*Sec.* 12. That every person and every corpora-

guilty of creating or continuing any such unlawful obstruction in this act mentioned, or who shall violate the provisions of the last four preceding sections of this act, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five thousand dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court, the creating or continuing of any unlawful obstruction in this act mentioned may be prevented and such obstruction may be caused to be removed by the injunction of any circuit court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the Attorney-General of the United States."

tion that shall violate any of the provisions of sections nine, ten, and eleven of this Act, or any rule or regulation made by the Secretary of War in pursuance of the provisions of the said section fourteen, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not exceeding twenty-five hundred dollars nor less than five hundred dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court. And further, the *removal* of any *structures* or parts of structures erected in violation of the provisions of the said sections may be enforced by the injunction of any circuit court exercising jurisdiction in any district in which such structures may exist, and proper proceedings to this end may be instituted under the direction of the Attorney-General of the United States."

Sections 9, 10 and 12 of the 1899 Act, and certain other sections thereof, were enacted as a result of the following procedure: The Rivers and Harbors Act of June 3, 1896 (Laws of U. S. for Rivers & Harbors, Vol. 1, p. 743; U. S. Statutes at Large, Vol. 29, p. 202) directed the Secretary of War

"to cause to be prepared a compilation of all general laws that have been enacted from time to time by Congress for the maintenance, protection, and preservation of the navigable waters of the United States which are now in force, and to submit the same to Congress to-

gether with such recommendation as to revision, emendation, or enlargement of the said laws as, in his judgment, will be advantageous to the public interest."

Accordingly, the Secretary of War, on February 13, 1897, submitted to Congress a letter of the Chief of Engineers dated February 10, 1897, which letter was accompanied by the compilation aforesaid, and a draft of Sections 9, 10 and 12 of the 1899 Act mentioned. The letters of the Secretary of War and Chief of Engineers are contained in House Document No. 293, 54th Congress, 2d Session. The draft as submitted by the Chief of Engineers and the Secretary of War, and as contained in the House Document mentioned, contains therein sections numbered 1, 2 and 4, which are identical with Sections 9, 10 and 12 of the March 3, 1899 Act.

We will now discuss the legal obstacles to this Court's sustaining the decree of the District Court, enjoining appellant from abstracting from Lake Michigan in excess of 4,167 cubic seconds feet of water.

I.

THE DIVERSION BY APPELLANT TO THE AMOUNT PROVIDED FOR UNDER THE ACT OF ILLINOIS OF MAY 29, 1889, UNDER WHICH APPELLANT WAS ORGANIZED AND EXISTS, HAS BEEN "AFFIRMATIVELY AUTHORIZED BY LAW" (RIVERS AND HARBORS ACT OF SEPTEMBER 19, 1890) LIKEWISE, IT HAS BEEN "AFFIRMATIVELY AUTHORIZED BY CONGRESS" (RIVERS AND HARBORS ACT OF MARCH 3, 1899).

(a) Appellant was organized under an Act of the General Assembly of Illinois, passed in the exercise of the state's police power. This Act fixed appellant's powers and duties and specified the required diversion of water from Lake Michigan.

Appellant, as has heretofore been pointed out in the statement, (p. 30), was organized under the Act of the General Assembly of Illinois passed May 29, 1889, in force July 1, 1889. There were three purposes of this legislation.

1. To provide for the organization of appellant.

2. To construct a canal with necessary adjuncts and appurtenances across the Continental Divide, from Chicago to Joliet, the minimum capacity of which should be not less than 10,000 cubic feet of water per second, which water, together with the drainage and sewage from Chicago and its environs, appellant was required to divert from Lake Michigan to the DesPlaines River for the purpose of protecting from pollution Chicago's only water supply.

3. To provide, by this Sanitary & Ship Canal and attendant diversion, from Lake Michigan to its southern terminus and on the Illinois River, a deep waterway, to take care of the demands of navigation.

Appellant was organized pursuant to its Organic Act by vote of the people. The Board of Trustees was elected. This Board immediately entered upon its duties to provide an outlet for the sewage and drainage of Chicago, as prescribed by the Organic Act. An ordinance was passed by the Board for the issue and sale of bonds for the purpose of raising money to carry out its objects. A taxpayer filed a bill to enjoin the operation of this ordinance on the ground that the Act under which appellant was organized, was repugnant to the constitution of Illinois. This suit was decided on appeal by the Supreme Court of the state on June 12, 1890.

Wilson v. *Board of Trustees*, 133 Ill. 443.

In another case,

People v. *Nelson*, 133 Ill. 565,

decided the same day, the Court again held the Act constitutional. The Court said (p. 580):

> "Of course it must be conceded both as a historical fact and as a fact abundantly shown by the terms of the act itself, that this scheme was formulated mainly, if not exclusively, with reference to the sanitary condition and needs of the City of Chicago and its environs, and we cannot give proper construction of the act without taking into account the peculiar situation of the territory which the proposed Sanitary District of Chicago is intended to embrace. * * * The object of the system of drainage proposed by said act, is to prevent the drainage and sewage of the City of Chicago and its environs being carried into Lake Michigan, thereby contaminating the waters of the lake. This result is to be reached by cutting a channel which will give an outlet for the drainage and sewage of the city in the direction of the Desplaines and Illinois Rivers, and which will also cause a large flow of water from the lake through the proposed artificial channel into those rivers, for the purpose of diluting the sewage and rendering it innocuous to the people living along the course of those streams."

In speaking of the amount of diversion, the Court said (p. 582):

> "The act contemplated a minimum flow of 300,000 and a maximum flow of 600,000 cubic feet of water per minute

through the proposed artificial channel into said rivers." (Desplaines and Illinois rivers.)

Further, in speaking of the removal of obstructions in the DesPlaines and Illinois Rivers, it was further said (p. 582):

> "Among these are the dams heretofore constructed by the state for the purpose of improving the navigation of the Illinois River, and the act specifically confers upon the district the power to make such removal."

In speaking of the waterway features of the Act, the Court said (p. 592):

> "The provisions of the act conferring upon the district powers and imposing upon it duties in relation to the waterways beyond the terminus of its own channel, were inserted for this purpose and are therefore a part, and a necessary part, of the general system of drainage for sanitary purposes embraced within the subject expressed in the title."

Again, the Court said (p. 594):

> "Section 24, however, recognizes the obvious fact that the contemplated channel when completed in such a way as to accomplish in a satisfactory manner the purposes for which it is designed, will constitute a waterway capable of being utilized for purposes of navigation, and therefore declares what, in the absence of such declaration, would be the fact, viz., that when so completed it shall be a navigable stream."

In

Pittsburg, Fort Wayne & Chicago Railway Company v. *The Santiary District of Chicago,* 218 Ill. 286,

a petition to condemn the lands of the railroad company along the south branch of the Chicago River, was filed (shortly after June 19, 1901) (p. 287):

> "to enable it (appellant) to deepen, widen and improve said river from Lake to Robey Streets and thereby increase the flow of water from Lake Michigan through said river into its main artificial channel, which connects with the said south branch at Robey Street and extends to Lockport—Illinois—increasing the said current in said

river to a greater velocity than that provided for by the Secretary of War in the permit issued to said Sanitary District by him permitting it to divert a portion of the waters of Lake Michigan to the said south branch into its main channel, * * * in order that it might comply with the statute of the State of Illinois and obtain a minimum flow through its channel of 300,000 cubic feet of water per minute and such additional quantities of water as from time to time the population of the Sanitary District might require."

The question was raised as to whether the Sanitary District had the power under its act to condemn this railroad property. The Court said (p. 295):

"The statute requires the Sanitary District to provide a minimum flow of 300,000 cubic feet of water per minute and the velocity of the flow was limited to 3 miles per hour, which was afterwards limited by the Secretary of War to 1¼ miles per hour. No water could be obtained except from Lake Michigan through the river with its narrow, winding and obstructed channel, which was lined with docks, railroads and other improvements, and when the statute authorized the Sanitary District to enter upon, use, widen, deepen and improve the Chicago River, * * * it manifestly intended to and did confer upon said Sanitary District the power to condemn any and all property * * * which was necessary for it to possess and control in order that it might successfully widen, deepen and improve said river, which clearly includes the property of appellants."

The acquisition of the property mentioned in the foregoing case, was required in order to carry out the comprehensive improvement of the Chicago River and its branches, by widening and deepening their channels, to provide for the withdrawal of at least 10,000 cubic seconds feet of water through these channels and the Sanitary & Ship Canal. The Secretary of War had by the two permits of July 11, 1900, authorized this "work" or improvement. (Appellant's Narrative, p. 92.)

So far as the authority of Illinois for the diversion was required it was full and complete. The works with their at-

tendant diversion were thus "authorized by law" under the Rivers and Harbors Act of September 19, 1890.

United States v. *Bellingham Bay Boom Co.*, 176 U. S. 211.

(b) The diversion of water from Lake Michigan to operate the Sanitary & Ship Canal of appellant has been authorized by the Act of Congress of March 2, 1827. (Appellant's Narrative, p. 412.)

The Act in question was entitled

> "An Act to Grant a Quantity of Land to the State of Illinois for the Purpose of Aiding in Opening a Canal to Connect the Waters of the Illinois River with those of Lake Michigan".

The first section of said Act provided

> "that there be, and hereby is, granted to the State of Illinois, for the purpose of aiding the State in opening a canal to *unite the waters of the Illinois River with those of Lake Michigan*, a quantity of land. * * * That the said canal, when completed, shall be, and forever remain, a public highway."

In order that the force and effect of this Act, and the intention of Congress thereunder, may be best understood, we will call attention to some of the attendant facts which undoubtedly were the cause of this legislation. At this time, and prior, the country was sparsely settled. The possibility of its development was generally recognized. Statesmen appreciated the value of water routes extending throughout the country then practically the only means of transportation. The necessity of developing these water routes was recognized as furnishing the only means by which the commercial activity of the country could be extended and the different parts bound together and made a homogeneous whole. It was necessary that the interests of the people located in different localities be made dependent one upon the other, by trade and travel. The Act of Cession of the Northwest Territory, by Virginia, passed in 1783, made it a condition of the grant that

it should be divided into states, not less than one hundred square miles nor more than one hundred and fifty square miles in extent. Under this plan, it was proposed to divide the Northwest Territory into fourteen or sixteen states. James Monroe shortly thereafter visited the country and reached the conclusion that there should be fewer states, and thereupon reported to Congress, and his report was adopted on July 7, 1786. The report, in referring to the division, stated (Appellant's Narrative, p. 404):

> "Some of the new states will be deprived of the advantages of navigation, some will be improperly intersected by lakes, rivers and mountains * * * Due attention ought to be paid to natural boundaries."

Thereupon the Ordinance of 1787 was passed, Article V thereof providing that the Northwest Territory should be divided into *not less than three states nor more than five states.* The division between the Western and Middle and Eastern states was provided to be substantially the present boundary between Illinois and Indiana and that between Ohio and Indiana. The Northern boundary of the three states was Canada. It was further provided that North of a line drawn through the Southern end of Lake Michigan that territory might be made into one or two states. The Illinois Enabling Act of Congress of 1818 was amended, at the time of its passage to include in Illinois the port of Chicago and a considerable portion of the shore of Lake Michigan to the present Northern boundary of Illinois. When this Enabling Act was amended, Mr. Pope, territorial delegate from Illinois stated, in proposing the amendment:

> "The object of this amendment was to gain for the proposed state a coast on Lake Michigan. This would afford additional security to the perpetuity of the Union inasmuch as the state would thereby be connected with the states of Indiana, Ohio, Pennsylvania and New York through the lakes. *The facility of opening a canal between Lake Michigan and the Illinois River * * * is acknowledged by everyone who has visited the place. Giving to the proposed state the port of Chicago, embraced in the proposed limits, will draw its attention to*

> *the opening of communication between the Illinois River and the improvement of that harbor.*" (Appellant's Narrative, p. 405.)

The water route from Lake Michigan through the Chicago River, its South branch and West fork, to the DesPlaines and Illinois Rivers had been used from time immemorial by explorers, adventurers and fur traders. In 1819, official reports were made by engineers and officers of the United States as to this route, and the feasibility of improving and enlarging it for navigation (Appellant's Narrative, p. 406.)

On March 30, 1822, Congress passed an Act entitled substantially the same as the March 2, 1827 Act, providing

> "That the State of Illinois be, and is hereby, authorized to survey and mark through the public lands of the United States the route of the canal *connecting the Illinois River with the Southern bend of Lake Michigan, and ninety feet of land on each side of the canal shall be forever reserved from any sale to be made by the United States.*" (Appellant's Narrative, p. 410.)

The failure of Illinois to act upon the grant within the time required caused it to be of no further force or effect.

Thereupon the General Assembly of Illinois memoralized Congress in 1826, calling attention to the importance of constructing a canal to unite the waters of Lake Michigan with the Illinois River, which

> "will form an important addition to the great connecting links in the chain of internal navigation, which will effectually secure the indissoluble federal union of this great and powerful republic." (Appellant's Narrative, p. 411.)

It was obviously important to the statesmen of that day that there should be an outlet to the sea from Lake Michigan. Undoubtedly the position of Great Britain, denying to the people of the United States the free navigation of the St. Lawrence River, also had an important bearing upon the purpose of Congress in providing for a canal and for the use of the waters of Lake Michigan to operate it (Appellant's Nar-

rative, p. 408). Great Britain maintained this position as to the St. Lawrence until the treaty of 1854, which granted merely the privilege to the people of the United States to pass along the St. Lawrence.

On January 9, 1836, the General Assembly of Illinois passed the Act under which the Illinois and Michigan Canal was constructed. Section 16 of this Act provided for the width of the canal and also that ninety feet on each side should be reserved for its future enlargement. This followed exactly the expressed will of Congress as to such reservation. The canal, as provided by said Section 16, was

> "to be supplied with water from Lake Michigan and such other sources as the Canal Commissioners may think proper." (Appellant's Narrative, p. 412.)

The Act of March 2, 1827, is still in force, and whatever rights were granted to, and whatever obligations were imposed upon, the State of Illinois under that Act, now exist. The Act authorized the construction of a canal across and through the public domain and granted lands to the state to aid in constructing it

> "to unite the waters of the Illinois River with those of Lake Michigan."

Lake Michigan was the highest point. It must necessarily have been the start of the canal. The only water supply for the operation of the canal was Lake Michigan. Illinois was empowered to construct a canal of any size that it considered reasonable to accomplish the objects desired,—in other words, to build such a canal as it considered would suit the demands of commerce. It was authorized not only then to construct the canal, but it was empowered further to improve, enlarge or supplant the canal and maintain one, at all times, in such manner as it considered the interests of navigation required. The State was empowered then to divert such quantity of water as in its judgment was necessary

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NOTE: The Sanitary and Ship Canal is approximately the width of the old Illinois and Michigan Canal plus the ninety feet on each side reserved for enlargement.

to operate the canal, and also to divert any other or greater quantity necessary to operate an enlarged canal to accomplish the purpose of the Act of Congress of March 2, 1827. There was no limitation on the amount of the diversion from Lake Michigan. Complete authority—all the authority that was required for this purpose—the State had under the Act of March 2, 1827.

In

Missouri v. *Illinois*, 200 U. S. 496,

Missouri instituted a suit to enjoin the Sanitary District from diverting water from Lake Michigan and turning its sewage and drainage into the DesPlaines and Illinois Rivers, claiming that it polluted the Mississippi River and the water supply of St. Louis. This Court said (p. 519):

> "In the case at bar, whether Congress could act or not, there is no suggestion that it has forbidden the action of Illinois."

The Court further said (p. 526):

> "Some stress was laid on the proposition that Chicago is not on the natural watershed of the Mississippi, because of a rise of a few feet between the Desplaines and the Chicago rivers. We perceive no reason for distinction on this ground. The natural features relied upon are of the smallest. And if, under any circumstances, they could affect the case, it is enough to say that Illinois brought Chicago into the Mississippi watershed in pursuance, not only of its own statutes, but also of the acts of Congress of March 30, 1822 (chap. 14, 3 Stat. at L. 659), and March 2, 1827 (chap. 51, 4 Stat. at L. 234), the validity of which is not disputed."

The effect of the Act of Congress of March 2, 1827, was interpreted by the Supreme Court of Illinois in

Mortell v. *Clark*, 272 Ill. 201.

In that case a taxpayer sought to enjoin the action of appellant in constructing the Calumet Sag Channel, an adjunct of the Sanitary and Ship Canal, extending from the Little Calumet River to the main canal at Sag, Illinois, and designed to reverse the flow of the Calumet River and furnish an out-

let for the sewage and drainage of the territory South of 87th Street in Chicago. It was claimed that there was no authority from the Federal Government to construct this canal. The Court said (p. 213):

> "Said act of 1903 permits the crossing of the Illinois and Michigan canal near Sag bridge and provides for the abandoning of certain portions of said canal. Counsel for appellant argue that this is in violation of the Federal grant of 1822, under which the Illinois and Michigan canal was constructed, which provides, among other things: 'If said ground shall ever cease to be occupied by and used for a canal suitable for navigation, the reservation and grant hereby made shall be void and of none effect.' (Hurd's Stat. 1913, p. LXXXVIII.) The canal was built under the authority of the act of Congress of March 2, 1827, the act of 1822 having been mutually abandoned by the State and Federal governments. (*Werling* v. *Ingersoll*, 181 U. S. 131; *Wells* v. *Wells*, 262 Ill. 320.) This Federal act did not provide just where the canal should enter Lake Michigan, simply stating that the land was granted for the purpose of opening 'a canal to unite the waters of the Illinois river with those of Lake Michigan,' etc. (Hurd's Stat. 1913, p. LXXXVIII.) *The sanitary district's main channel as now constructed practically complies with this act and furnishes a canal more suitable for navigation than the Illinois and Michigan canal. Furthermore, the Sag channel or cut-off is required to be navigable* by said act of 1903, and the proof shows that the Calumet river is navigable to the point where it is intersected by the Sag channel. *This cut-off would therefore also practically comply with both of said Federal acts as to furnishing part of the canal for connection of the Illinois river with Lake Michigan.*"

The Illinois-Michigan Canal was placed in operation in 1848. No sooner had it been completed than the necessity of its enlargement was recognized. The General Assembly of Illinois in 1861 provided for a survey to be made for the enlargement and improvement of this water course and the diversion of waters from Lake Michigan

> "to secure a free-flowing, ample and never failing supply of water sufficient for navigation of the Illinois River at all season and times." (Appellant's Narrative, p. 415.)

President Lincoln in his message to Congress of December 1, 1862 (Vol. 5, Messages and Papers of the Presidents, p. 3334) stated:

> "The military and commercial importance of enlarging the Illinois-Michigan Canal and improving the Illinois River is presented in the report of Colonel Webster to the Secretary of War and now transmitted to Congress. I respectfully ask attention to it."

Congress provided for a survey for the improvement of this water course on June 23, 1866, and the next year, February 12, 1867, General Wilson made recommendations as to its improvement. The summit level of the canal was cut down at the expense of the City of Chicago in 1871 to provide for the taking of a greater amount of water from Lake Michigan to operate the canal. Pursuant to Acts of Congress, in 1875, 1880, 1882 and 1887, further reports were made as to the enlargement of the waterway by constructing a deep waterway with a large diversion from Lake Michigan to the DesPlaines and Illinois Rivers. (Statement, p. 19.)

The day before the Act under which appellant was organized was passed, May 28, 1889, the General Assembly of Illinois passed a resolution stating its waterway policy—namely

> "That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practical depth and usefulness for navigation from Lake Michigan via the Desplaines and Illinois Rivers to the Mississippi River, and to encourage the construction of feeders therto of like proportions and usefulness." (Appellant's Narrative, p. 448.)

Only two years before appellant's Organic Act was passed, Major Handbury made a report under the Rivers and Harbors Act of August 5, 1886, which report was published in the Chief of Engineers' report for the year 1887, in which he stated (Appellant's Narrative, p. 447):

> *"The United States and the State of Illinois have long been committed to the project of opening a water communication between the Mississippi River and the northern lakes of capacity sufficient for the wants of commerce*

> *and for the exigencies of our national defense, should these ever arise.* * * * Pushing this improvement through to the Lake, the connecting link will be formed which will join the northern lakes with the vast network of navigable rivers whose waters flows into the Gulf of Mexico *on a scale to a certain degree commensurate with the importance of the commerce and will be affected by it.*"

The State of Illinois, in providing for the construction of the Sanitary & Ship Canal of the size capable of diverting at least 10,000 cubic feet of water from Lake Michigan for sanitary and navigation purposes, proceeded with deliberation and care. It's acts, in this respect, were consonant with the interpretation of the March 2, 1827 Act by Congress and by appellee's officers extending over half a century.

The basic principle of the plan, as stated, was the reversal of the Chicago River at all times so that it would not ever flow into Lake Michigan, carrying with it its sewage and drainage pollution. The maximum flood run-off of the Chicago River drainage area or flow of the Chicago River being 10,000 seconds feet, it is obvious that the capacity of the Sanitary & Ship Canal could not be less. To provide a "never-failing" supply of water for navigation of the Illinois River at all times, it was likewise necessary to have a volume of water from Lake Michigan for navigation purposes of that amount. (Statement, p. 18.) The improvement of navigation by the construction of the Sanitary & Ship Canal, and its diversion of water, required the amount necessary to protect the Chicago water supply.

Major Marshall, the U. S. Engineer at Chicago, on May 1, 1889, pursuant to the Rivers and Harbors Act of August 11, 1888, made a report which is published in the Chief Engineers' Reports, concerning the improvement of this waterway. This report was made while the bill to authorize the construction of these works was pending in the General Assembly of Illinois. He reported the purpose of the diversion in the same

way, as appears from the following statement of his report (Rec. Vol. IV, 2172):

> "Whenever the large channel contemplated by the City of Chicago for drainage is actually determined upon, *in view of the fact that a channel for navigation and the channel for drainage across the Chicago divide must necessarily occupy the same field, it is evident that to avoid duplication of expense, the channel, at least in the expensive rock section, should be constructed best to meet the requirements of navigation in slope, velocity of current, and dimensions of section, while at the same time of sufficient flowing capacity to carry off the drainage of the Sanitary District.*"

Illinois fixed the amount of the diversion by appellant's organic act which action was also pursuant to the Act of Congress of March 2, 1827. The diversion has, thus, not only been "affirmatively authorized by law," but also "affirmatively authorized by Congress," complying with both the Rivers and Harbors Acts of September 19, 1890, and of March 3, 1899.

(c) Appellee, through its engineer officers and the Secretary of War, observed the action of the State of Illinois and of appellant pursuant to its authority in planning and constructing the diversion works. The Secretary of War consented to the work necessary to accomplish the diversion and authorized the opening of the main channel of the district. The Secretary of War construed the Congressional act of March 2, 1827, and the laws of Illinois, as affirmatively authorizing the diversion.

The Chief of Engineers, immediately upon the passage of the appellant's Organic Act of May 29, 1889, reported to Congress the fact of its passage, and the report contained a copy of the Act. It contained also a copy of the report of the Drainage and Water Supply Commission of January 30, 1887. It is published in the Chief of Engineers Reports for

1890 (Appellant's Narrative, p. 451). In this report Major Marshall stated (Appellant's Narrative, p. 453):

> "This route has invited attention as a practicable locus for a waterway between the Great Lakes and Mississippi River for many years, and its advantages, have been so often reported to Congress, that anything herein said would be mere repetition."

Each year the Chief of Engineer's reports contained statements of the progress of the work on the construction of the Sanitary & Ship Canal.

August 16, 1895, the Board of Engineers, of which General Poe was Chairman, reported to the Secretary of War as to the effect of the diversion of 10,000 cubic seconds feet of water from Lake Michigan upon the surface elevations of the Great Lakes. (Appellant's Narrative, p. 464.)

Even Congress took cognizance of the report of Major Marshall of January 27, 1897, by specifically mentioning the report in the Rivers and Harbors Act of March 3, 1899. (Statement, p. 48.) Major Marshall's report was made pursuant to a prior act of Congress. In this report thus specifically mentioned by said Rivers and Harbors Act, it is stated that the Sanitary & Ship Canal had approximately been completed, with a depth of from 18 to 22 feet, and with a width in the rock section of 160 feet to more than 200 feet in earth

> *"which may be made available as part of any enlarged waterway over the route in question."*

It is further stated

> "To comply with the law of the State of Illinois under which this drainage canal is constructed—it has been constructed of a capacity to discharge 600,000 cubic feet per minute through the section excavated in rock, and 300,000 cubic feet per minute throughout the earth section—the law requires a discharge of 20,000 cubic feet per minute for each 100,000 inhabitants of the Drainage District, which at present requires more than 300,000 cubic feet, and in a few years will require the full 600,000 cubic feet discharge through the canal." (Appellant's Narrative, p. 487.)

Early in the construction work, April 21, 1891, the Board of Trustees of appellant laid out a project to enter upon, use, widen, deepen and improve the Chicago River and the South Branch from Lake Michigan to the West Fork

> *"so as to make the same a proper and sufficient supply channel for the main channel heretofore surveyed from the Chicago River to Joliet."* (Appellant's Narrative, p. 454.)

A copy of this ordinance was sent to the Secretary of War.

The Sanitary & Ship Canal was constructed and excavated entirely in lands within the State of Illinois and not upon any lands or in any navigable waters of the United States. However, to accomplish the taking of the water from Lake Michigan through the Chicago River and its branches to the Sanitary & Ship Canal, it was necessary to greatly deepen and widen their channels. Otherwise the water could not be drawn through in the quantities required by appellant's diversion works. This was the occasion for the ordinance of April 21, 1891, above mentioned.

June 16, 1896, to carry out this object, the Sanitary District made request to the Secretary of War for a permit to improve the Chicago River and certain of its branches in certain particulars. In this request, appellant stated:

> **"The work of the Sanitary District of Chicago has progressed so far that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey Street, Chicago, to Lockport, in Will County, 28 miles distant. Our connection with Lake Michigan must be through the Chicago River, the West Fork of the South Branch, of which we make a junction at Robey Street. (Appellant's Narrative, p. 38.)**

The Secretary of War, July 3, 1896, granted the request for

> **"permission to make certain changes in the capacity of the channel of the Chicago River * * * at points indicated on the map accompanying the application"**

on condition—

> "(1) That while the general plan is approved, the Sanitary District of Chicago must furnish plans in triplicate on an enlarged scale, showing each proposed new bridge, each by-pass and each new dock or wharf proposed to be built in order that the Secretary of War may act intelligently in each case.
>
> (2) That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must be hereafter submitted for consideration." (Appellant's Narrative, p. 474.)

Was there anything in this transaction that indicated that the Secretary of War did not consider appellant to be authorized by law to divert the water provided by appellant's Organic Act, 20,000 cubic feet per minute for each 100,000 of the population?

Following this permit, there were many others issued on request of the Sanitary District, consenting to the work of deepening and widening the Chicago River, its South Branch and West Fork, and prior to the opening of the canal on January 17, 1900. (Appellant's Narrative, p. 475.)

The work of the improvement of the Chicago River prior to the opening of the Sanitary & Ship Canal, looked only to so enlarging the cross section of its channels as to allow the withdrawal through it of the water required at that time, the population of appellant being approximately a million and a half. So when the Sanitary & Ship Canal was constructed, appellant requested a permit for the opening of same (May 8, 1899 permit). Among other recitals, it was stated that *permission has heretofore been granted to make certain improvements in the Chicago River for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of* 300,000 *cubic feet per minute, with a velocity of* 1¼ *miles an hour,*

> "it being intended to connect the said original channel with the West Fork of the South Branch of the Chicago River at Robey Street, in the said City of Chicago." (Appellant's Narrative, p. 22.)

Then permission is granted to open the channel constructed and cause the water of the Chicago River to flow into the same, subject to the following conditions only:

(1) Congressional action.

(2) Current in the Chicago River.

(3) Sanitary District to be responsible for damage to property.

Here there was affirmative evidence of the Secretary of War's understanding that the diversion was authorized by law, and it was his only duty to approve the plans for the work of securing a proper channel from Lake Michigan through these rivers to the Sanitary and Ship Canal, by which the necessary water could be diverted for sanitary and navigation purposes.

The work of improving the channels of the Chicago River and its branches, authorized by the two permits of July 11, 1900, (Appellant's Narrative, p. 92) was done for the avowed purpose of making those channels of such width and depth that they could properly carry through them 10,000 cubic seconds feet of water from Lake Michigan to the Sanitary and Ship Canal. (Requests for Permits, Appellant's Narrative, pp. 90, 91.) The depth under these permits, as will be recalled, was 26 feet and the width at all points of 200 feet. The work has been done according to these plans so approved at a cost of upwards of $10,000,000.

(d) The Secretary of War, charged with the duty of enforcing the Rivers and Harbors Acts of September 19, 1890, and March 3, 1899, has thus construed a diversion to the capacity of appellant's Sanitary and Ship Canal, to have been "affirmatively authorized by law" and "affirmatively authorized by Congress." These acts of the Secretary of War should have the force of judicial interpretation.

In

Hastings & Dakota Railroad Company v. *Whitney*, 132 U. S. 357, 366,

suit was instituted to recover certain lands which the defendant claimed it owned under a United States patent. A question arose as to the construction of the Soldiers' Homestead Law. This Court said:

> "It is true that the decisions of the Land Department on matters of law are not binding upon this court in any sense, but on questions similar to the one involved in this case, they are entitled to great respect in the hands of any court."

> "In *U. S.* v. *Moore*, 95 U. S. 760, 763, this Court said: 'The construction given to a statute by those charged with the duty of executing it, is always entitled to the most respectful consideration, and ought not to be overruled without cogent reasons. * * * The officers concerned are usually able men and masters of the subject; not infrequently they are the draftsmen of the laws they are afterwards called upon to interpret.'"

See, also,

Shells Executors v. *Fauche*, 138 U. S. 562, 572.
Heath v. *Wallace*, 138 U. S. 573, 582.

The Act of Congress of March 2, 1827, providing for the construction of a canal from Lake Michigan to the Illinois River, thus expressly authorized the State of Illinois to divert such quantity of water as it should deem reasonably necessary for navigation purposes, not only for the operation of the canal, but for the purpose, also, of providing deeper channels at low water times in the Illinois River, so that naviga-

tion thereon would be assured—navigators would feel secure in having the proper depths. At no time during the history of the construction and installation of the works of appellant, did any officer or agent of appellee suggest that this authority did not exist. It was recognized from the beginning. When the State of Illinois provided for the construction of appellant's works to divert at least 10,000 cubic seconds feet of water through the Sanitary & Ship Canal, the officers of the United States carefully observed the activities of appellant in making plans for these works and in doing the construction work. These facts were reported to Congress. When it became necessary to excavate or fill in the channels of the Chicago River and its branches, there was no hesitancy indicated in granting the permission in order that appellant's Sanitary & Ship Canal when completed might be made effective for the purpose of diverting the required water from Lake Michigan for sanitary and navigation purposes. When the canal was ready to be opened, like consent was given without limitation, except concerning current in the Chicago River unreasonably obstructive to navigation thereon. The future action of Congress was, of course, made, also, a condition which would exist in any event without its being named as a condition in the permit. The Secretary of War thus authorized the work of reversing the current and flow of the Chicago River which would be accomplished by opening the Sanitary & Ship Canal.

When the canal was opened, the channels of the Chicago River and its branches had been improved to provide for the withdrawal then necessary for the then population of appellant, approximately 1½ millions of people. To provide for the increase in population, it was necessary to comprehensively enlarge and improve these channels in order to take the additional volume of water from Lake Michigan through them to appellant's Sanitary & Ship Canal.

Appellant's requests for permits to do this work, were made on April 26 and June 7, 1900. Almost immediately thereafter the Secretary of War consented to the doing of the work,

approved the plans for the work, (July 11, 1900), and the work was done. *"The work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."* (Sec. 10, Rivers and Harbors Act of March 3, 1899, *ante*, p. 106.)

The Secretary of War, in authorizing the opening of the Sanitary and Ship Canal, and in authorizing the excavation in the channels of the Chicago River and its branches to provide for the diversion through them to the Sanitary and Ship Canal of the amount of water required by appellant, must be deemed to have construed and interpreted the March 2, 1827 Act and the Illinois Act of May 29, 1889, as authorizing appellant's diversion.

II.

THE PERMITS OF THE SECRETARY OF WAR OF JULY 11, 1900, AUTHORIZING THE WORK OF DEEPENING AND WIDENING THE CHANNELS OF THE CHICAGO RIVER TO PROVIDE FOR THE DIVERSION OR ABSTRACTION FROM LAKE MICHIGAN THROUGH THEM OF THE AMOUNT OF WATER REQUIRED BY THE STATE LAW ACCORDING TO THE POPULATION OF APPELLANT, CONSTITUTED ALL THE AUTHORITY REQUIRED BY APPELLANT FROM APPELLEE, TO DIVERT SAID WATERS.

We will consider, now, the force and effect of Section 10 of the Rivers and Harbors Act of March 3, 1899, without regard to the Act of March 2, 1827, providing for the construction of the Illinois and Michigan Canal across the Chicago or Continental Divide.

In this connection it must be remembered that the Act of May 29, 1889, of the Illinois General Assembly specifically directs and empowers appellant to build and operate its diversion works to abstract from Lake Michigan 20,000 cubic feet of water per minute for each 100,000 population of appellant. The population of appellant at the time the decree was entered herein, exceeded three million inhabitants, thus requiring 600,000 cubic feet of water per minute, or 10,000 cubic feet per second. This authority, of course, is fundamental, and is the foundation of appellant's acts in this respect. Was there any further authority required than that the work should be

> "recommended by the Chief of Engineers and authorized by the Secretary of War prior to the beginning of same"? (Sec. 10, Rivers and Harbors Act, March 3, 1899.)

Excavating and filling in the channels of the Chicago River and its branches, was the only work appellant was required to do in navigable waters of the United States to accomplish

and bring about the diversion. The reversal of the current and flow of the Chicago River and its branches was a necessary result. Anyway, this was consented to specifically by the permit of May 8, 1899, for the opening of the canal. The work of improving these channels was done for the purpose only of providing for the abstraction of the water through them in a proper manner. The only requirement of Congress was that appellant should not excavate or fill or in any manner alter or modify the course, location, condition or capacity of any port, road-stead, haven, harbor, canal, lake, harbor of refuge or enclosure within the limits of any breakwater or of the channel of any navigable water of the United States, unless *the work was recommended by the Chief of Engineers and authorized by the Secretary of War prior to the beginning of same.* The waters were entirely within the confines of the State of Illinois. Appellant having unquestioned state authority, having obtained the authorization of the Secretary of War before commencing *the work* of *excavating,* etc., leading to the alteration or modifying of the course, location, condition or capacity of navigable waters and having done *the work,* the operation of its Sanitary & Ship Canal and other diversion works was and is lawful. That includes, of course, the diversion of water to the amount required by state authority. (10,000 cubic feet per second.)

It has never been suggested that the work of deepening and widening the channels of the Chicago River and its branches under the two permits of July 11, 1900, was not properly performed. While the statement of Secretary of War Stimson of January 8, 1913, in refusing to remove the limitation fixed by the Secretary of War of December 5, 1901, (4,167 cubic seconds feet of water) and to expressly authorize the diversion of 10,000 seconds feet, is perhaps not material here as the statute does not require any findings to be made in such cases, yet there is nothing in such statement as to any failure of appellant to perform the work under said permits. In fact, there is nothing in said statement suggesting any difficulties in navigating the Chicago River and its

branches. (Appellant's Narrative, p. 28.) On the other hand, it is plain that the improvement of the Chicago River made by appellant and all its works have been great aids to navigation. The river was deepened and widened, old bridges were replaced with new bascules, creating vastly deeper, wider and freer channels.

The construction of Sections 9 and 10 of the Rivers and Harbors Act of March 3, 1899, was thoroughly considered in

> *Maine Water Company* v. *Knickerbocker Steam Towage Company*, 99 Maine 473 (decided Feb. 17, 1905).

The Water Company brought suit against the Towage Company for damages sustained to the Water Company's pipe line across the Kennebeck River at Bath, a tidal, navigable river, wholly within the state. The placing of the pipe line in the river was properly authorized by the state. The Secretary of War issued a permit as recommended by the Chief of Engineers, for the work of placing the pipe line in said river. It was claimed by the defendant that the pipe line unlawfully occupied the river, inasmuch as there was no Act of Congress expressly authorizing the plaintiff to place its pipe line in said river. The Court compared Sections 7 and 10 of the Rivers and Harbors Act of September 19, 1890, and Sections 9 and 10 of the Rivers and Harbors Act of March 3, 1899.

Before further discussing the Court's opinion in the Maine case, we will, for the convenience of this Court, set forth in juxtaposition similar clauses of the sections of the two Acts mentioned. Words and clauses not common to both Acts are in italics and, for convenience in future reference, the separate clauses in the 1890 Act will be designated (*a*), (*b*), etc., and those in the 1899 Act (*aa*), (*bb*), etc., respectively.

1890.		1899.	
Sec. 7.	*a*	*Sec.* 10.	*aa*
It shall not be lawful to build any wharf, pier, dol-		It shall not be lawful to build *or commence the*	

phin, boom, *dam*, weir, breakwater, bulkhead, jetty, or structure *of any kind*, outside established harbor-lines, or in any navigable waters of the United States where no harbor-lines are or may be established, *without the permission* of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, *in such manner as shall obstruct or impair navigation.*

Sec. 7. b

It shall not be lawful hereafter to commence the construction of any bridge, *bridge-draw, bridge piers* and abutments, causeway or other works *over or in any port, road, roadstead, haven, harbor, navigable river* or *navigable waters of the United States*, under *any act of the legislative assembly* of *any* state, until the location and plan of such bridge or other works *have been* submitted to and approved by the Secretary of War.

Sec. 7. c

That *this section* shall not * * * be so construed as *to authorize* the construction of any bridge, *draw-bridge, bridge piers and* abutments, *or other* works, *under an act of the legislature of any state*, over or in any *stream*, port,

building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty or *other* structures in any port, roadstead, haven, harbor, canal, navigable river or other water of the United States, outside established harbor lines or where no harbor lines have been established, *except on plans recommended by the Chief of Engineers and authorized* by the Secretary of War.

Sec. 9 bb

Such structures (any bridge, *dam*, dike or causeway) *may* be built *under authority* of the *legislature* of *a* state *across* rivers and *other waterways, the navigable portions of which lie wholly within the limits of a single state*, provided the location and plans *thereof are* submitted to and approved *by the Chief of Engineers* and by the Secretary of War, *before construction is commenced.*

Sec. 9. cc

That it shall not be lawful to *construct or commence* the construction of any bridge, dam, dike or causeway over or in any port, roadstead, haven, harbor, *canal, navigable river*, or other navigable water of the United States, until the

roadstead, haven or harbor, or other navigable water not wholly within the limits of such state.

Sec. 7. *d*

It shall not be lawful * * * to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of the channel of said navigable water of the United States, unless *approved* and authorized by the Secretary of War.

Sec. 7. ***d1.***

That this section shall not apply to any bridge, bridge-draw, bridge piers and abutments, the construction of which has been heretofore duly authorized by law.

Sec. 10. *e*

That the creation of any obstruction, not affirmatively authorized by *law,* to the navigable capacity of any waters, *in respect of which the United States has jurisdiction,* is hereby prohibited.

consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War.

Sec. 10. *dd*

It shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of *any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or* of the channel of *any* navigable water of the United States, unless *the work has been recommended by the Chief of Engineers* and authorized by the Secretary of War *prior to the beginning of same.*

Sec. 10. *ee*

That the creation of any obstruction, not affirmatively authorized by *Congress,* to the navigable capacity of any *of the* waters of the United States is hereby prohibited.

Sec. 10. *f*

The creating or continuing of any unlawful obstruction in this act mentioned may be prevented and such obstruction may be *caused to be removed* by the injunction of any circuit court exercising jurisdiction in any district in which such *obstruction may be threatened or* may exist; and proper proceedings in equity to this end may be instituted under the direction of the Attorney-General of the United States.

Sec. 12. *ff*

The *removal* of any *structures or parts of structures erected in violation of the provisions of the said sections* may be *enforced* by the injunction of any circuit court exercising jurisdiction in any district in which such *structures* may exist, and proper proceedings to this end may be instituted under the direction of the Attorney-General of the United States.

The Court

(*Maine Water Company* v. *Knickerbocker Steam Towage Company, supra*)

said:

(477) "We cannot help remarking, in passing, that if the defendant's interpretation of the Act of 1899 is the correct one, it leads to a rather surprising condition. It would seem that not a wharf or pier, outside established harbor lines, or where no harbor lines have been established, can now be built, in the navigable waters of the United States, not a dolphin can be anchored for mooring vessels, not a boom can be stretched, nor a weir erected for any purpose, until hereafter authorized by Act of Congress. We think it cannot be assumed that Congress intended any such result unless the Act in question is so expressed as not to admit of any other reasonable interpretation."

The effect of the first sentence of Section 10 of the 1899 Act containing the prohibition against obstructions "not affirmatively authorized by Congress", was particularly important. The Court with reference to this, further said:

(481) "The general prohibition in section 10 is brought with only one substantial change from section 10 of the Act of 1890. The Act of 1890 said 'not affirmatively authorized by law,' which was held in *U. S.* v. *Bellingham*

Bay Boom Co., 176 U. S. 211, to mean not only by a law of Congress, but even by a law of the state in which the river is situated. The Act of 1899 says 'not affirmatively authorized by Congress.' Following this general prohibition, and immediately connected with it, is the remainder of section 7 of the Act of 1890, which relates to wharves and other structures, which would include this pipe line. The only important change is this. The Act of 1890 made unlawful the erection of such structures without the permission of the Secretary of War, in the waters of the United States, outside established harbor lines, or where no harbor lines have been established, in such manner as shall obstruct or impair navigation. The Act of 1899 makes unlawful such erections, except they are built on plans recommended by the Chief of Engineers and authorized by the Secretary of War.

Although in the arrangement of parts, the general prohibition now is found at the beginning of a section which also relates to the specific regulation of the building of wharves and so forth, instead of being in a section by itself as before, we are not persuaded that Congress, by changing its position, intended to change its effect. It is still general as before. And though general in terms before, we think, as we have stated, that structures impliedly authorized by Congress in the preceding sections were not prohibited. And in its new position we think that the general prohibition is likewise qualified by the sentences which follow. It cannot make any substantial difference whether the general prohibition is at the beginning of a section, or at the end, or in a section by itself, if it clearly appears from the language used and from the context, all taken together, that the legislative intention was that the general prohibition was to be regarded as subject to specified qualifications. * * *

* * * the implication seems clear to us that such structures, if built according to plans recommended and authorized as provided in the section, are authorized by Congress—that they are affirmatively authorized,—though the affirmative authority arises by implication,—and that they are lawful without any further action by Congress."

Structures actually named in the 1899 Act are wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, bridge, dam, dike or causeway. The words "or other structures" follow the naming of each class. The bridges rebuilt were the only

structures built by appellant in connection with the deepening and widening of the Chicago River and its branches actually named in the Act. As to such structures, the *plans* were required to be approved by the Chief of Engineers and Secretary of War, and there is no question about these bridge structures. The work of excavating for the widening and deepening, and the work of construction of docks, was covered by the general clause with reference to excavating and filling. (*dd* above p. 135.) As to this (excavating for widening and deepening and thereby to alter and modify, etc.) the *work* (of such deepening and widening) should be

> *"recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."*

The *work* was so *recommended* and *authorized*. The *work* was done. Thus the altering or modifying the course, location, condition or capacity of the navigable waters of the United States flowing from the work so *recommended* and *authorized*, was lawful. It was immaterial, therefore, *where the navigable waters of the United States were located* that were thus altered and modified as the result of the work so *recommended* and *authorized*.

The altering or modifying of the navigable capacity of the waters, not only of the Chicago River and its branches, but of Lakes Huron, Michigan, Erie, Ontario, their connecting waters, and other navigable waters of the United States, by the diversion of water provided for through appellant's works, was thus authorized and is lawful.

Cummings v. *Chicago*, 188 U. S. 410.

The case of

Hubbard v. *Fort*, 188 Fed. 987 (Circuit Court, opinion by District Judge Rellstab)

is contrary to the opinion of the Supreme Court of Maine in the *Water Company case, supra*. But in that case, the receivers of the Hudson County Water Company who filed the bill to enjoin officers of the State of New Jersey from interfering with the construction of their conduits in the Kill von Koll,

were acting contrary to an Act of New Jersey expressly forbidding the diversion of the waters of New Jersey into the State of New York. The New Jersey Act was held constitutional and valid in

Hudson County Water Company v. *McCarter*, 209 U. S. 349.

In

Southern Pacific Co. v. *Olympian Dredging Co.*, 260 U. S. 205, 210,

this court, in construing the Rivers and Harbors Acts here in question, cited with approval

Maine Water Co. v. *Knickerbocker Steam Towage Co.*, 99 Me. 473, *supra.*

III.

IN ANY EVENT, THE SECRETARY OF WAR HAS AUTHORIZED THE OPENING OF APPELLANT'S SANITARY & SHIP CANAL, ITS OPERATION AND ATTENDANT DIVERSION OF WATER FROM LAKE MICHIGAN BY THE PERMIT OF MAY 8, 1899, EVERY CONDITION OF WHICH HAS BEEN FULFILLED, ASSUMING SUCH CONDITIONS TO BE VALID. THE SECRETARY OF WAR WAS ONLY AUTHORIZED TO GRANT OR REFUSE A PERMIT. HE HAD NO POWER TO REGULATE THE DIVERSION OF WATER AT CHICAGO. THE ATTORNEY GENERAL HAD NO AUTHORITY TO INSTITUTE THE SUIT FOR INJUNCTION.

(a) The effect of the May 8, 1899 permit and attempted limitation thereon.

The Sanitary & Ship Canal was completed during the year 1898 of capacity and size sufficient to take through it the maximum diversion, 14,000 cubic seconds feet of water, when the population of the appellant reached an amount requiring such diversion according to the ratio of dilution fixed by the state law—20,000 cubic feet per minute for each 100,000 of population. The population of the Sanitary District was then only about a million and a half. In order that the amount of water necessary to dilute the sewage of this population might be taken through the channels of the Chicago River and its branches, these channels were partially improved under various permits and authority of the Secretary of War, beginning with July 3, 1896. Notwithstanding the improvements of these channels that had been made, they were still shallow, narrow and tortuous, at some places being only 100 feet wide. With this condition in mind, when the appellant sought to obtain the consent of the Secretary of War to the opening of the Main Channel, the Secretary granted the

permit to open the Sanitary & Ship Canal without any limitation as to the amount of water, except that the current created by the withdrawal should not be unreasonably obstructive to navigation on the Chicago River. This condition was inserted with the view that the channels of the Chicago River and its branches would be later vastly deepened and widened, to provide for the future increase in population and the efficient operation of the canal to divert all of the sewage and drainage of Chicago and its environs. The channel was opened pursuant to this permit on January 17, 1900. Immediately thereafter, appellant made application to the Secretary of War, May 26th and June 7th, 1900, (Appellant's Narrative, pp. 90, 91) to comprehensively improve these rivers. The purpose of such improvement was stated—namely, to provide the means by which the necessary waters of Lake Michigan and the drainage and sewage could be carried to the Sanitary & Ship Canal. The permits of July 11, 1900, for this work were granted in order to carry out this express purpose.

There was no occasion for appellant to thus deepen the Chicago River from 17 to 26 feet and widen it at all points to 200 feet, rebuild bridges at an expense of ten and one-half millions of dollars, if its diversion from Lake Michigan would be limited to 4,167 seconds feet, the amount fixed by the decree of the District Court herein.

With the channels of the Chicago River in this restricted condition, the Secretary of War, on December 5, 1901, directed that the maximum flow through the Chicago River and its South Branch should not exceed 250,000 cubic feet per minute. The orders so limiting the flow, expressly recited the condition of the May 8, 1899 permit as to current in the Chicago River, and that commercial and navigation interests thereon had made objections. (Appellant's Narrative, pp. 23-26.)

The permits of July 11, 1900, for the work of comprehensively deepening and widening the channels, were in existence, had not been revoked, and appellant was proceeding to act under them.

It did do the work thus *authorized* and *recommended*, with the knowledge of the Secretary of War and the Chief of Engineers, without objection. There was no indication or suggestion that the December 5, 1901, order would be sought to be enforced when the work recommended and authorized under the July 11, 1900, permits, was done. In fact, as these river channels were improved, and the population of the district increased, water was diverted in amounts vastly greater than the limitation of 250,000 cubic seconds feet, (the order of December 5, 1901.) (Appellant's Narrative, p. 202.) In addition to the river improvement, appellant otherwise completed its diversion works by constructing the intercepting sewers, North Shore and Sag Channels, with their adjuncts, pumping stations, etc., at a total cost for all works of upwards of $75,000,000.00 and all this was done pursuant to authority of the Secretary of War. (Appellant's Narrative, p. 194.)

After Secretary of War Taft had on March 14, 1907, refused a permit for the diversion of 4,000 cubic feet per second through the Calumet River and the then proposed Calumet Sag Channel, which amount was additional to the diversion of 10,000 cubic feet per second then being provided for through the Chicago River and its branches, the Attorney General of the United States instituted suit, March 23, 1908, to enjoin its construction. (Appellant's Narrative, p. 2.) This suit only involved a diversion by way of the Calumet River and the Calumet Sag Channel *in addition to that through the Chicago River.*

The bill of complaint in the Calumet Sag suit, after reciting the ordinance of the Board of Trustees of appellant providing for the construction of the Calumet Sag Channel, alleges that the construction of said channel,

> "will result in diverting and abstracting from Lake Michigan a large quantity of water, towit, 4,000 cubic feet of water per second, and causing said water to flow through said Calumet Rivers into said Calumet Sag

Channel, through that channel into the Main Channel of said Sanitary District, and thence to the DesPlaines and Mississippi Rivers, and on to the Gulf of Mexico."

Paragraphs 16 and 17 of the answer in said Calumet suit, filed March 23, 1908, describe appellant's Sanitary & Ship Canal and the various other works constructed as adjuncts thereto, for the diversion of 10,000 cubic seconds feet through the channels of the Chicago River and its branches (Appellant's Narrative, p. 12). Yet no legal action or protest was made concerning the actual diversion through the channels of the Chicago River and its branches, of water in excess of the limitation of December 5, 1901, or concerning the diversion that would necessarily take place to the maximum capacity of the Sanitary & Ship Canal as the improvement of the channels of the Chicago River was completed, and as the population of appellant increased.

When the improvement of the channels of the Chicago River was completed, the cause and the reason for the limitation by the order of the Secretary of War of December 5, 1901,—250,000 cubic minutes feet withdrawal from Lake Michigan—was removed. Necessarily it followed that such limitation should then have no further force or effect. It had been so treated, not only by the Secretary of War, but also by the Attorney General in failing, March 23, 1908, or afterwards to take any action thereon.

In the meantime, the International Waterways Commission constituted under authority of the Rivers and Harbors Act of Congress of 1902 (Appellant's Narrative, p. 526) had specially reported finding that there was a tacit general agreement that the diversion of at least 10,000 cubic seconds feet of water would exist at Chicago. The Treaty of 1909 between Great Britain and appellee as to Canadian Boundary Waters, had been made upon the recommendations as to terms made by the International Waterways Commission. Furthermore, the Treaty itself recognized diversions of water from the Great Lakes System for sanitary purposes as paramount and taking precedence over all others.

The Act for the preservation of Niagara Falls had been passed June 29, 1906. Section 1 contained a proviso that under no circumstances should it permit the Secretary of War to limit the diversions for sanitary and domestic purposes except as Congress might in the future direct. (Statement, p. 51.)

Consequently, on February 5, 1912, the channels of the Chicago River and its branches having been deepened and widened pursuant to the permits of July 11, 1900, appellant sought the removal of the limitation of diversion contained in the order of December 5, 1901, and an express authorization for the diversion of at least 10,000 cubic seconds feet by means of all of its diversion works. Appellant undoubtedly assumed, as it had the right to, that the limitation of December 5, 1901, was merely a technical or paper limitation. It desired to have a cloud removed upon its otherwise perfect title. However, May 8, 1913, the Secretary of War refused this application, (Appellant's Narrative, p. 28), and the complaint here in controversy was filed October 6th, 1913.

The action of the executive officers of the Government in seeking to enjoin the operation of appellant's works as required by state law and under all the circumstances, is arbitrary and unreasonable. Equity cannot grant the relief asked and equity would undoubtedly enjoin any overt acts taken by such officers to enforce the said limitation of December 5, 1901.

In

Monongahela Bridge Co. v. *U. S.*, 216 U. S. 177, 195,

it was claimed by the respondent that the action of the Secretary of War was arbitrary and unreasonable in connection with the direction for the alteration of a certain bridge. The Court said:

> "Learned counsel for the defendant suggests some extreme cases, showing how reckless and arbitrary might be the action of executive officers proceeding under an act of Congress, the enforcement of which effects the enjoyment or value of private property. It will be time

enough to deal with such cases as and when they arise. *Suffice it to say that the courts have rarely, if ever, felt themselves so restrained by technical rules that they could not find some remedy, consistent with the law, for acts, whether done by government or by individual persons, that violated natural justice or were hostile to the fundamental principles devised for the protection of the essential rights of property."*

In

Philadelphia Company v. *Stimson*, 223 U. S. 605,

the Court recognized the right of an aggrieved person in equity to enjoin the arbitrary and unreasonable action of the Secretary of War.

In

Kwock Jan Fat v. *Edward White*, as Commissioner of Immigration, 253 U. S. 454, 464,

this Court, in speaking of the power of the Commissioner of Immigration, said:

"It is a power to be administered, not arbitrarily and secretly, but fairly and openly."

The limitation of 4,167 seconds feet, diversion, does not now exist under any condition of the May 8, 1899, permit.

(b) The Attorney General under the Act of March 3, 1899, is only authorized to institute suits in equity for the removal of structures. The District Court was without jurisdiction to entertain this suit or enter the decree.

The suit here is that appellant be enjoined

"from diverting or abstracting any waters from Lake Michigan over and above and in excess of 250,000 cubic feet per minute, as already authorized by said Secretary of War. * * *" (Appellant's Narrative, p. 21.)

Section 12 of the Act of March 3, 1899, authorizing suits in equity, only related to

"the removal of any structures or parts of structures erected in violation of said sections (9-10 and 11)". 'Laws, Improvement Rivers and Harbors, Vol. 2, p. 887, *ff* above p. ....)

Obviously, this suit does not seek the removal of any structure. It was not the purpose of Congress that the Attorney-General should have any other powers than that to cause the removal, by injunction, of structures built contrary to the provisions of the Act. It was not intended that these executive officers could by injunction interfere with the operation of works built under state authority for the protection of public health even though they might have the effect of incidentally obstructing navigation. Congress intended to deal with such cases individually and separately.

That this construction of the effect of Section 12, viz., that it is limited to the institution by the Attorney General of suits only to remove unlawful structures, is borne out by a reference to the provisions of the Act of September 19, 1890, as to such injunction suits. The only clause relating to such suits, is contained in the latter part of Section 10, (Laws Improvement of Rivers and Harbors, Vol. I, p. 583, *f* above p. 136.)

> "the creating or continuing of any unlawful obstruction in this act mentioned, may be prevented and such obstruction may be caused to be removed by the injunction of any Circuit Court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the Attorney General of the United States."

The elimination of the words

> "the creating or continuing of any unlawful obstruction in this act mentioned may be prevented"

contained in the 1890 Act, from the 1899 Act upon a similar subject, and the failure to substitute any words even remotely alike, leads to the inevitable conclusion that it was the intention of Congress that the Attorney General's activity should be confined solely and only to suits to enjoin *the removal* of unlawful *structures.*

Webster's New International Dictionary defines "structure" to be—

> "Something constructed or built, as a building, a dam, a bridge, esp. a building of some size; an edifice."

The clause of the 1899 act refers to "*structures erected*" in violation, etc. Those words cannot possibly cover the excavation in the Chicago River and its branches, such as deepening and widening, which was the work done for the diversion in excess of the 4,167 seconds feet specified by the order of the Secretary of War of December 5, 1901. It cannot refer to appellant's Sanitary and Ship Canal. The words "*structures erected*" certainly would not include a canal built or excavated. These words convey the impression of something placed in a navigable water, which things by their very form or by reason of the very location, would obstruct navigation. The word "structure" is a much narrower term than "obstruction." The word "obstruction" may include a "structure," but the word "structure" certainly cannot cover every "obstruction."

An examination of Sections 9 and 10, furnishes the definition of the word "structures" as used in Section 12. In Section 9, the things mentioned are "bridge, dam, dike or causeway." These are referred to in two places in said section as "such structures," once as "other structure," and once as "the structure."

In Section 10, particular things are also described as "wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty." Immediately following the naming of them, are the words "or other structures." Certainly appellant's works for the diversion of this water to the amount required, can not possibly be of the character of the things mentioned as structures. In the first sentence of Section 10, the word "obstruction" is used, and in the last sentence of Section 10 "excavating or filling" is referred to as "work." Had the clause with reference to the Attorney General's instituting suit for injunction in the 1890 Act, been included in the 1899 Act, the Attorney General could have proceeded with reference to obstructions to enjoin their creation or continuance, and also to enjoin the beginning of the work of excavating or filling, or the continuance of the enjoyment of the benefits derived from excavating or filling contrary to the provisions of the Act.

It is important also to consider that in the first part of Section 12, any violations of Sections 9 and 10 "shall be punished by fine or by imprisonment." That portion of Section 12 is as follows:

> "That every person and every corporation that shall violate any of the provisions of sections nine, ten and eleven of this Act, or any rule or regulation made by the Secretary of War in pursuance of the provisions of the said section fourteen, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding twenty-five hundred dollars nor less than five hundred dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court." (Above p. 109.)

It is plain that the above quoted provision covers the doing of anything contrary to the provisions of Sections 9 and 10, excavating or filling or the creating of an obstruction or the constructing or commencing the construction of any of the *structures* mentioned. It must be presumed that Congress believed that the exaction of the penalty and imprisonment was a sufficient remedy to prevent the creation of obstructions or the excavating or filling contrary to the provisions of the Act. It may be further presumed that Congress did not intend to give to the Attorney General, or any other officer of the United States, the broad power by injunction to prevent the doing of the things by a state or municipality which would only indirectly obstruct navigation; that is, where it was an incidental result of the state's or municipality's action, such as exists in this case. If the power were granted the courts would perhaps feel themselves compelled to enforce it, notwithstanding the dire results that might follow. Thus, by the mere fiat of an executive officer, could the whole course and plan of a state for the protection of the health of its people, be set at naught. The executive officer could thus prevent the carrying out of a most important waterway policy of the state, affecting not only the people of the state, but the people of the entire nation.

In

Ogden City v. *Boreman*, 20 Utah 98, 57 Pac. 843,

the question arose as to whether the City of Utah by ordinance could provide for a license fee to be paid for practicing law in Ogden. It was held that the Statutes of Utah did not empower cities to make such requirement. The laws of Utah as codified in 1888, expressly provided for the licensing of lawyers. There was also a general clause in the 1888 laws authorizing cities to license all trades and businesses. When the laws were re-codified in 1898, the provision with reference to lawyers was not included. It was argued that the general clause covered and embraced the right to license lawyers. The court cited

Endlich on Interpretation of Statutes, Sec. 51.

Sutherland Statutory Construction, Sec. 140.

and held that the City of Ogden had no power to impose a license fee on lawyers. The court said:

> (142) "In Suth. St. Const. Sec. 140, it is said: 'An affimative enactment of a new rule implies a negative of whatever is not included or is different; and if, by the language used, a thing is limited to be done in a particular form or manner, it includes a negative that it shall not be done otherwise. An intention will not be ascribed to the law making power to establish conflicting and hostile systems upon the same subject, or to leave in force provisions of law by which the later will of the legislature may be thwarted and overthrown.' By repealing the clause providing for licensing and taxing lawyers, and enacting the general clause referred to, leaving lawyers and the professions generally out of such re-enactment, impels the conclusion that the legislature intended to deprive the cities of the power to impose a license fee or tax upon lawyers that they had formerly possessed. There must have been an object and purpose in this deliberate repeal in one section and omitting to insert its provision in the act as reenacted, having special reference to licensing and taxing in cities."

The Attorney General and the United States District Attorney who instituted this suit, cannot rely upon the general power to

> "prosecute * * * all civil actions in which the United States are concerned."

The statute with reference to the control of navigable waters by the United States, provides a remedy in certain instances. It necessarily follows that the remedies in instances not named are denied. This is particularly convincing when authority as to certain situations, such as filing a bill to enjoin the creation or continuance of an obstruction, is eliminated from the 1899 Act.

The case of

U. S. v. *Rio Grande Dam & Irrigation Company*, 174 U. S. 690,

is not an authority in support of the Attorney General's power to enjoin the operation of an obstruction under the March 3, 1899, Act. In that case, the bill was filed under the Act of September 19, 1890, which expressly authorized such injunctive relief. Furthermore, the authority of the Rio Grande Dam & Irrigation Company arose by virtue of the Act of the Territory of New Mexico. There was no reserved power of the state exercised as there is here.

The injunctive relief is not available for the United States in the event of the failure of a person, firm or corporation owning a bridge to alter it, as directed by the Secretary of War under Section 18 of the Rivers and Harbors Act of March 3, 1899. The only remedy is the enforcement of the penalty expressly provided by said section.

The Attorney General not being authorized to institute a suit for injunction in the instance described in this proceeding, the District Court was, therefore, without jurisdiction. It could not enter the decree enjoining the continuance of the acts of appellant, for there is no statute providing for either the institution of the suit or its entertainment by the Court.

(c) The Secretary of War is only authorized to grant or refuse a permit. He has no power to regulate the diversion.

An examination of Sections 9 and 10 clearly discloses that there is not delegated to the Secretary of War, the power to supervise or regulate the operation of works placed in navigable waters of the United States. No such discretionary power is given. He has not the power to act as a supervising or construction engineer. He is merely to authorize the construction of certain specific works on plans recommended or approved by the Chief of Engineers.

With reference to the structures before the Court, as heretofore pointed out, he is merely to authorize the work that has been recommended by the Chief of Engineers. So, when the Secretary of War authorized the opening of the Sanitary & Ship Canal by removing the earth between the West Fork of the South Branch of the Chicago River and the excavated channel of the Sanitary & Ship Canal at its Northern Terminus, he had performed his duty; likewise his jurisdiction over the subject ended, and he could not thereafter regulate the operation of the Sanitary & Ship Canal.

The Secretary of War, by the order of December 5, 1901, boldly, by the use of the very words, assumes "to regulate" the diversion. (Appellant's Narrative, p. 24, 25.) The decree of the lower court seeks to enforce that order. Both the decree and the order of the Secretary of War attempt to regulate the diversion, a power clearly not existing in either the Secretary of War or the Court under said Rivers and Harbors Act of March 3, 1899.

IV.

REGARDLESS OF THE EFFECT OF THE ACT OF CONGRESS OF MARCH 2, 1827, PROVIDING FOR THE CONSTRUCTION OF THE ILLINOIS AND MICHIGAN CANAL ACROSS THE CONTINENTAL DIVIDE, AND THE INTERPRETATION OF SECTION 10 OF THE ACT OF MARCH 3, 1899, AS HERETOFORE STATED, NEVERTHELESS, THE ILLINOIS ACT OF MAY 29, 1889, UNDER WHICH APPELLANT HAS BUILT AND IS OPERATING ITS DIVERSION WORKS, IS VALID AND ENFORCEABLE, PURSUANT TO THE POLICE POWER RESERVED TO THE STATES UNDER THE CONSTITUTION. THE DIVERSION BY APPELLANT TO THE AMOUNT NECESSARY FOR THE OPERATION OF ITS WORKS IS LAWFUL WITHOUT EXPRESS CONSENT OF THE SECRETARY OF WAR. ANY OTHER CONSTRUCTION OF THE ACT OF MARCH 3, 1899, WOULD TEND TO NULLIFY APPELLANT'S ACTS IN THE INTEREST OF PUBLIC HEALTH. THIS RESULT CANNOT OBTAIN UNLESS SUCH CONGRESSIONAL INTENTION IS EXPRESSED IN PLAIN AND UNMISTAKABLE TERMS.

The proper consideration of the questions involved in this case, necessarily leads one to investigation and determination of the extent of the police powers expressly reserved to the States by the Tenth Amendment to the Constitution. It involves necessarily the construction of the Commerce clause of the Constitution and the various congressional acts in exercise of this power. We are not here concerned with any question as to whether Congress may not occupy the entire field concerning the regulation of navigable waters of the United States, whether wholly within or partly within and partly without the limits of a state, thereby intentionally excluding entirely state control over those waters within its limits. Obviously, Congress has not, under the Rivers and Harbors Act

of March 3, 1899, or any other act, attempted to enact legislation to exclusively control and regulate these navigable waters.

The question necessarily first arises as to whether the State's Act of May 29, 1889, authorizing the diversion of water by means of appellant's works, is inoperative so far as the diversion is concerned without express congressional authority; that is, without some act of Congress expressly and in unmistakable terms, authorizing this particular diversion and its amount. Was it intended by Congress to exclude the exercise by the state of its police power to protect the health of its people? The query is also presented whether the failure of the Secretary of War to give his consent to the abstraction of the water to the amount claimed by appellant that it requires, *ipso facto*, prevents said abstraction or withdrawal. The state being authorized to take such water from Lake Michigan as is reasonably required to protect the water supply of appellant's population, the Secretary of War cannot frustrate the state's efforts for this worthy purpose, by merely refusing his consent.

The situation would not be different had Congress plainly and unmistakably, by special act, authorized the State of Illinois to divert from Lake Michigan, 10,000 cubic seconds feet of water through its various diversion works, subject to the Secretary of War's authorizing, by permit, the work of deepening and widening the channels of the Chicago River and its branches to take through them this amount of water, without creating any current injuriously affecting navigation on said river channels. Appellant presents its plans for such work. Secretary of War approves them and authorizes the work. The Secretary of War then fails to remove a limitation fixed as to the amount of withdrawal made because of the then condition of the river channels as to shallowness and narrowness. The work is done. There is no objection or suggestion, by the Secretary of War in refusing to remove the limitation, that there are difficulties of navigation on the Chicago River by reason of

current resulting from appellant's abstraction. He arbitrarily refuses to remove the limitation, saying that he does not believe that the necessities of the occasion require it, or for any other reason, outside of the ones which he was authorized by the Congressional Act to consider. Such action obviously would entirely destroy the carrying out of the will of Congress under this supposed special act authorizing a definite amount of withdrawal. This very situation exists here for three reasons;

(1) The March 2, 1827 Act authorized the State of Illinois to build a canal and divert water for its uses, the amount of withdrawal to be determined by the State for the canal's purposes. The state has fixed that amount by the Act of May 29, 1889. Thus we have express congressional action for that amount of withdrawal.

(2) The Secretary of War has authorized *the work* as *recommended* by the Chief of Engineers, which work would result in the withdrawal of the water, to the extent of at least 10,000 cubic feet, and the altering or modifying of the navigable capacity of the navigable waters of the United States.

(3) The State likewise has reserved to it the police power to take the amount of water reasonably required for the purposes designed—namely the protection of the water supply of Chicago and its environs. Of course the amount must be determined by the State and Congress has not occupied the field to such an extent as to deny to the state that power.

In either one of the three instances above mentioned, the Secretary's refusal to remove the limitation of December 5, 1901, arbitrarily deprives the State of Illinois of enjoying that to which it is entitled under any one of these situations.

The cases which we desire to cite under this Point of our brief, are applicable to the various propositions suggested under this heading (Point IV), now to be discussed. Where a

case cited on one proposition applies to the others mentioned under this heading, we assume that they will be so considered, thus avoiding repetition.

(a) The Illinois Act of May 29, 1889, under which appellant was organized and exists, was sufficient legislative authority for the construction of appellant's various diversion works and for the diversion of water from Lake Michigan as required by such works.

This Act of May 29, 1889, of the Illinois General Assembly, rests upon the police power of Illinois reserved to it by the Constitution and never delegated to the Federal Government.

It had two objects: *first*, the protection of public health; *second*, the improvement of the state's waterways. There is no question raised in this record that the work provided for under this act and the diversion of water from Lake Michigan in the amount required by said act was not reasonably necessary to accomplish the objects and purposes of the legislation. The action of the state in this respect was taken deliberately, after thorough investigation and consideration. The necessity for the diversion and construction of the various diversion works, the Sanitary and Ship Canal and its adjuncts, for waterway purposes, has never been questioned. In fact, from the very time the old Illinois and Michigan Canal was built, its enlargement either by excavation in the canal itself or by the construction of the new canal paralleling it, and the diversion of large quantities of water for its operation and for the benefit of navigation on the Illinois River, was recommended continuously by government engineers. Contemplating the history of the development of this project, we find a unanimity of purposes for the development of this waterway.

In connection with the purpose sought—protection of the public health—the state likewise pursued the only course open to it. The old Illinois and Michigan Canal had been used as a partial outlet for the drainage and sewage finding its way

into the Chicago River, its South Branch and West Fork, to cleanse the river and to some extent keep pollution from the water supply. In the year 1871 it was enlarged at the expense of the City of Chicago to withdraw the water by gravity. In 1884, additional devices were provided, pumps at the northern terminus of the canal, to divert a greater quantity of water. The Continental Divide being insignificant at Chicago, made possible the passage of the drainage and sewage polluting water from Lake Michigan across it. It enabled Chicago to adopt the very best method to provide a pure and unpolluted water supply for its people. The alarming prevalence of typhoid fever epidemics aroused the people of Chicago to an appreciation of the dangers confronting the community. Chicago set about to solve this problem in a wise manner. She created in 1886 the Drainage and Water Supply Commission, which deliberately and carefully studied from health and waterway standpoints the entire problem, and recommended the construction of the works built by the Sanitary District—the Sanitary and Ship Canal and its adjuncts, and the diversion of water from Lake Michigan to operate them, as provided by statute.

The effect upon the Great Lakes System, navigable waters of the United States, if any, is entirely incidental to the carrying out of the purpose of the operation of appellant's works. The improvement of the channels of the Chicago River and its branches, the building of the Sanitary and Ship Canal and its various adjuncts, has admittedly improved and benefitted waterways within the State of Illinois. The channels of the Chicago River and its branches have been made deeper and wider and freed of all obstructions. The old Illinois and Michigan Canal between Chicago and Joliet, has been replaced or supplanted by the Sanitary and Ship Canal, of a size sufficient to meet all possible demands of commerce, and in keeping with the State and Federal intention, as to the canal's enlargement,—even the express congressional purpose under the Act of March 30, 1822.

Section 10 of the Rivers and Harbors Act of March 3, 1899, has been definitely construed by this Court in

Cummings v. *Chicago*, 188 U. S. 410,
Montgomery v. *Portland*, 190 U. S. 89.

In

Cummings v. *Chicago*, 188 U. S. 410,

Cummings proceeded to reconstruct a dock along the Calumet River, a river entirely within the state's limits. The dock was located within the City of Chicago. Cummings had obtained the consent of the Secretary of War to the doing of the work as recommended by the Chief of Engineers, but had failed to obtain the approval of the proper officer of the City of Chicago, as required by an ordinance of said city. It appeared, also, that Congress had provided for the improvement of this river by deepening and widening it, and it was claimed that thereby and in addition to the intention expressed by Secton 10 of the Rivers and Harbors Act of March 3, 1899, the United States had assumed exclusive jurisdiction over this river. The Secretary of War, in issuing his permit for the dock's reconstruction, recited the provisions of Section 10 of the 1899 Act and issued the permit thereunder. The Chicago authorities threatened to stop Cummings in his construction work, and the bill was filed to enjoin such threatened action on the ground that Cummings, by obtaining the Secretary of War's authority, was completely and fully authorised. It will be observed that a dock is not specifically mentioned in either Sections 9 or 10, but is likely the character of a structure mentioned in Section 10, such as pier, wharf, etc. At any rate, to build the dock it was necessary to excavate or fill in the Calumet River, a navigable water of the United States. This Court held that to fully empower Cummings to reconstruct the dock, it was necessary to have the approval of the City of Chicago, required under said ordinance, in addition to that of the Secretary of War; that when those two approvals were obtained, then the acts of Cummings would be entirely lawful; that under Section 10, the Secretary of War had the authority without any further

or other act of Congress specifically consenting to the reconstruction of this particular dock.

This Court, in passing upon this question, said:

(427) "Calumet river, it must be remembered, is entirely within the limits of Illinois, and the authority of the state over it is plenary, subject only to such action as Congress may take in execution of its power under the Constitution to regulate commerce among the several states. That authority has been exercised by the state ever since it was admitted into the Union upon an equal footing with the original states."

The Court further said (428):

"Did Congress, in the execution of its power under the Constitution to regulate interstate commerce, intend by the legislation in question to supersede, for every purpose, the authority of Illinois over the erection of structures in navigable waters wholly within its limits? Did it intend to declare that the wishes of Illinois in respect of structures to be erected in such waters need not be regarded, and that the assent of the Secretary of War, proceeding under the above acts of Congress, was alone sufficient to authorize such structures?"

Again, it is stated (430):

"If it had intended by the act of 1899 to assert the power to take under national control, for every purpose, and to the fullest possible extent, the erection of structures in the navigable waters of the United States that were wholly within the limits of the respective states, and to supersede entirely the authority which the states, in the absence of any action by Congress, have in such matters, such a radical departure from the previous policy of the government would have been manifested by clear and explicit language. In the absence of such language it should not be assumed that any such departure was intended."

* * *

"Whether Congress may, against or without the expressed will of a state, give affirmative authority to private parties to erect structures in such waters, it is not necessary in this case to decide. It is only necessary to say that the Act of 1899 does not manifest the purpose of Congress to go to that extent under the power to regulate foreign and interstate commerce and thereby to supersede the original authority of the states. *The effect*

of that act, reasonably interpreted, is to make the erection of a structure in a navigable river, within the limits of a state, depend upon the concurrent or joint assent of both the national government and the state government. The Secretary of War, acting under the authority conferred by Congress, may assent to the erection by private parties of such a structure. Without such assent the structure cannot be erected by them. But under existing legislation they must, before proceeding under such an authority, obtain also the assent of the state acting by its constituted agencies."

In

Montgomery v. *Portland*, 190 U. S. 89,

the Secretary of War had established, under the Congressional Act, harbor lines in the Willamette River. Likewise, harbor lines were established under state authority, which coincided with the harbor lines fixed by the Secretary of War, beyond which piers, wharfs, etc., could not be built. Montgomery obtained a changing of the harbor line by the Secretary of War, whereby the harbor line was extended further out into the stream, and the Secretary of War consented to his building his wharf there and beyond the harbor line fixed by state authority. He proceeded to build his wharf on the line last fixed by the Secretary of War, and the City of Portland filed its bill in the State Court to enjoin construction, and the case reached this Court by writ of error to the Supreme Court of Oregon. The Court reiterated its holding in the *Cummings case*, and held that to permit Montgomery to construct his wharf on the new line fixed by the Secretary of War, it was necessary also to obtain the state's consent. It then said (p. 107):

> "It is sufficient now to say that the legislation upon which the defendant relies to justify the construction of the works in question does not, when reasonably interpreted, indicate any purpose upon the part of Congress to assume such complete and absolute control of the navigable waters of the United States as will make of no avail the action of the states in respect of the erection by private parties of structures in waters wholly within their respective limits."

Ths Court, in the *Cummings* and *Montgomery cases, supra*, held that the state's authority was concurrent with that of the Federal Government under the Rivers and Harbors Act of March 3, 1899, and that the state's direct regulation of navigable waters within its limits had not been denied or superseded by the legislation mentioned. How much stronger is the case where the state's action is in the interest of public health, as here, and where the principal effect of appellants works upon navigation is in aid thereof and the claimed injury, if any, to commerce is only indirect and incidental.

In

Corrigan Transit Company v. *The Sanitary District of Chicago*, 137 Fed. 851, (C. C. A. 7th Circuit),

the permit of May 8, 1899, authorizing the opening of appellant's Sanitary and Ship Canal, was directly under consideration. The suit was filed by the Corrigan Transit Company to recover damages to a boat which damage it was claimed resulted from the current in the Chicago River created by appellant's diversion. The Court held that the recitals or preambles of the permit of May 8, 1899, did not limit the granting clause—namely, to open the channel; that therefore the permit was unlimited. In other words, there was express authority from the Secretary of War to operate the Sanitary and Ship Canal to its full capacity.

In speaking of the effect of Section 10 of the Rivers and Harbors Act of March 3, 1899, the Court of Appeals, speaking through Mr. Justice Baker, said (p. 856):

> "Congress, acting under the commerce clause, said to Illinois, which would otherwise be sovereign, 'You are not to change the course of the river unless you first obtain the secretary's approval of your plan.' The sentence in its entirety—the subjunctive clause as well as the indicative—expressed the will of Congress. The expressed intention was, not to exclude Illinois utterly from exercising her police powers over the river for the welfare of her citizens (and that suggests a nice and delicate question), but to permit the continuation of the exercise upon condition. Now, if the conditional clause is to be deleted, it is not for the courts to construct a new

congressional policy out of the fragment. Compare *Montgomery* v. *Portland*, 190 U. S. 105, 23 Sup. Ct. 735, 47 L. Ed. 965.

(4) If section 10 stands, libelants' attack fails, because defendant obtained the permit and complied with its conditions. If section 10 falls, what is the result? If a matter affecting commerce is of national scope and susceptible of uniform regulation, the failure of Congress to speak to the subject is deemed equivalent to a declaration that the states shall let the matter alone; but if the matter is local, and concerns the public policy of a state, though it may incidentally affect interstate and foreign commerce, congressional inaction is a recognition that the subject is fitted for local regulation, and is an invitation that the state continue in the unimpeded exercise of its police powers, on the understanding, however, that Congress may thereafter intervene to the extent, at least, of destroying and forbidding whatever unnecessarily embarrasses commerce. *Covington Bridge Co.* v. *Kentucky*, 154 U. S. 204, 14 Sup. Ct. 1087, 38 L. Ed. 962; *Lake Shore, etc., Ry. Co.* v. *Ohio*, 173 U. S. 285, 19 Sup. Ct. 465, 43 L. Ed. 702, and cases therein cited. The bridging, dredging, purification of a navigable waterway wholly within a state are matters of the latter class. *Escanaba Transp. Co.* v. *Chicago*, 107 U. S. 678, 2 Sup. Ct. 185, 27 L. Ed. 442; *Lake Shore, etc., Ry. Co.* v. *Ohio*, 165 U. S. 365, 17 Sup. Ct. 357, 41 L. Ed. 747. With the commerce clause in abeyance, Illinois, as to every being in the world except future Congresses, was absolute sovereign in the premises. The absolute sovereign may change the grade of highways or may vacate them, may alter the courses and currents of rivers or may dam or fill them up, and neither alien nor subject traveler and navigator may complain. No one can claim a vested right to have the United States interfere with Illinois, nor can a cause of action arise from want of interference."

The work of excavating to provide for the diversion has been authorized by the Secretary of War and recommended by the Chief of Engineers. The reversal of the course and current of the river, has likewise been authorized. The connection of the Sanitary and Ship Canal with the West Fork of the South Branch of the Chicago River, was approved. Everything for the lawful diversion to the full capacity of the Sanitary and Ship Canal has been obtained.

In

Canada Atlantic Transit Company v. *Chicago*, 210 Fed. 7, (C. C. A. 7th Circuit),

the court had before it an ordinance of the City of Chicago requiring that vessels navigating the Chicago River when passing any bridge, shall move at a rate of speed not less than two miles per hour, and that steam vessels of 1,200 gross tons burden, or more, while navigating certain portions of the river, shall have the assistance of a tug or tugs. The court held the ordinance valid, and that it was within the province of the state, acting through the City of Chicago, to make such regulation. It also held that the reasonableness of the ordinance was not to be questioned, saying, through Judge Seaman:

(10) "All the contentions on behalf of the appellants in derogation of such power inherent in the state, must be overruled".

With reference to the inherent power of the state the court said:

(11) "Neither preponderance of evidence nor proof which convinces the court of want of justifiable cause for the requirements, can serve to authorize judicial interference with legislative action upon a subject within the power of the state or municipal legislation."

The Court cited upon this proposition the strong statement of Mr. Justice Holmes in *Laurel Hill Cemetery* v. *San Francisco*, 216 U. S. 358.

We apprehend that the capacity of the navigable water of the United States may be altered or modified in the way provided by said ordinance mentioned in Canada Atlantic Transit Co., *supra*, just as completely, so far as the effect upon commerce is concerned, as they may be altered by excavation or filling in such navigable waters.

We refer the Court to the following cases:

Escanaba L. M. Transportation Company v. *Chicago*, 107 U. S. 678.

Lake Shore & Michigan Southern Railroad Company v. *Ohio*, 165 U. S. 365.

Cardwell v. *American River Bridge Company*, 113 U. S. 205.

Huse v. *Glover*, 119 U. S. 543.

Willamette Iron Bridge Company v. *Hatch*, 125 U. S. 1.

The creation of the appellant's Sanitary and Ship Canal and its other diversion works, was "authorized by law" under the Rivers and Harbors Act of September 19, 1890.

United States v. *Bellingham Bay Boom Co.*, 176 U. S. 211.

The Act of March 3, 1899, declaring that obstructions "not authorized by Congress" were prohibited (Section 10), did not intend to make unlawful those things lawfully provided for under the 1890 Act.

(b) The diversion by appellant to the amount necessary for the operation of its works, is lawful without the express consent of the Secretary of War. Any other construction of the Act of March 3, 1899, would tend to nullify appellant's acts in the interest of public health. This result cannot obtain unless such congressional intention is expressed in plain and unmistakable terms.

The position boldly taken by appellee is that Congress has provided that nothing shall be done affecting navigable waters of the United States unless the consent of the Secretary of War has been obtained, and that the diversion beyond 4,167 seconds feet is unlawful unless the Secretary of War has directly and in terms consented to it. It is immaterial, says appellee, for what reason the Secretary of War has failed to expressly authorize the excess diversion. We have shown that the work of excavating in the channels of the Chicago River for the purpose of withdrawing water to the full capacity of appellant's Sanitary and Ship Canal was authorized

by the Secretary of War; that he had directed and authorized the opening of this canal and its connection with the river; that the permit of May 8, 1899, so authorizing, was unlimited except by the maximum capacity in the Sanitary and Ship Canal; and that the Secretary of War had limited the withdrawal by his order of December 5, 1901, before the work of excavating, pursuant to the Secretary of War's authority of July 11, 1900, had been commenced or completed. We have then, under the July 11, 1900 permits, direct authority to alter or modify the navigable capacity of the navigable waters of the United States, wherever situated, necessary or resultant from the work of excavating which had been done. We have, on the other hand, a supposed limitation of the amount of withdrawal, never removed, which is in conflict with the permits of July 11, 1900. There is also the refusal of the Secretary of War to remove the limitation—not because of any condition expressed in the May 8, 1899 permit, but because of the claimed injury or obstruction to navigable waters other than the Chicago River—namely, the Great Lakes and their connecting channels. However, the Great Lakes and their connecting channels were waters, if the appellee's contention is correct as to the effect of the diversion thereon, which would be altered or modified by the doing of the work of excavating authorized by the Secretary of War under the July 11, 1900 permits.

We lay aside, for the moment, all these circumstances relating to the unreasonableness of the Secretary of War's action in failing to remove the limitation of December 5, 1901, and our contention that the diversion is lawful for the reason that the work necessary to accomplish the diversion of 10,000 cubic seconds feet of water through the channels of the Chicago River and its branches to the Sanitary and Ship Canal has been fully authorized.

The acts of appellant, taken pursuant to the state's police power, in diverting the amount of water required for sanitary purposes and the protection of the water supply, must stand as lawful, without the express consent of the Secretary

of War. These acts, under the undoubted reserve power of the state, must prevail over the acts of or failure to act by the Secretary of War, unless it is clear that Congress intended otherwise. There is no such intention expressed in any Congressional act. It has always been recognized by this Court that the protection of public health by the states is paramount. Congressional acts or authority apparently in conflict with such acts taken by the state must be so reconciled that the state may be left unfettered in the exercise of such police power. Of course, it is assumed that in such instances the state's acts are reasonably necessary to accomplish the purpose desired.

In

Columbus v. *Mercantile Trust Co.*, 218 U. S. 645,

this court said, (658):

> "No higher police duty rests upon the municipal authority than that of furnishing an ample supply of pure and wholesome water for public and domestic uses."

In

Missouri v. *Kansas Natural Gas Co.*, 68 L. Ed. Advance Sheets p. 585, June 16, 1924,

this court held that the State of Kansas was without power to fix rates of gas sold by a supply company transporting the gas in mains from outside the state. In no instance did the supply company sell the gas directly to consumers but merely sold it to distributing companies, who thereupon transmitted and sold it to individual concerns. This followed the holding in the case of

Public Utilities Commission v. *Landon*, 249 U. S. 236.

However,

Pennsylvania Gas Co. v. *Public Service Commission*, 252 U. S. 23,

was a case where the gas was transmitted from Pennsylvania directly to the consumers of the gas in Jamestown, New York. The acts taken under the authority of the State of

New York in fixing the price of gas to the consumers was held valid by this court. In distinguishing that case, this court said, in

Missouri v. *Kansas Natural Gas Co., supra,* (p. 587)

"The service to the consumers, which was the thing for which the regulated charge was made, was essentially local, and the decision rests upon this feature."

In

Texas v. *White,* 7 Wall. 700, 725,

it is stated:

"But the perpetuity and indissolubility of the Union by no means implies the loss of distinct and individual existence, or of the right of self-government by the states. * * * The Constitution, in all its provisions, looks to an indestructible Union, composed of indestructible states."

In

New York v. *Miln,* 11 Peters 102, 139,

a penalty was provided by the state for the failure of a ship's master to, within twenty-four hours, report the names, age and last settlement of persons on board the vessel arriving at port. This court said:

"It is not only the right, but the bounden and solemn duty of a state to advance the safety, happiness and prosperity of its people, and to provide for its general welfare by any and every act of legislation which it may deem to be conducive to these ends."

The delimitation between the state's police powers and the powers exercised under the Commerce Clause of the Constitution of Congress was so thoroughly discussed by this court in

Minnesota Rate Cases, 230 U. S. 352,

that is seems unnecessary and useless to attempt to add any thing to the opinion in that case. In that case this court said (402):

"Further, it is competent for a state to govern its internal commerce, to provide local improvements, to cre-

ate and regulate local facilities, to adopt protective measures of a reasonable character in the interest of the health, safety, morals and welfare of its people, although interstate commerce may incidentally or indirectly be involved."

In

Lake Shore & Michigan Southern v. *Ohio*, 173 U. S. 285,

a state law providing for stops of trains at certain stations was upheld, even though it operated upon interstate trains.

In

Hennington v. *Georgia*, 163 U. S. 299,

a state law providing against the operation of all trains on Sunday, state or interstate, was upheld. This court said (317):

> *"Legislative enactments of the states passed under their admitted police powers, and having a real relation to the domestic peace, order, health and safety of their people, but which, by their necessary operation, affect, to some extent, or for a limited time, the conduct of commerce among the states are yet not invalid by force alone of the grant of power to Congress to regulate such commerce."*

It is the rule, many times repeated, that the power of Congress under the Commerce Clause of the Constitution is a dormant one and remains in the states until Congress occupies the field or assumes the power; yet it is also the established rule that without the exercise of specific power interstate commerce must be free. Any law of the state directly obstructing such commerce is invalid. So the cases upholding state laws, passed in the interest of public health, safety or morals, which operate indirectly in obstructing interstate commerce, are in point in determining the validity of similar acts of the state which indirectly affect or burden some regulation of such commerce expressly provided by Congress. In such situation, unless the congressional act clearly and plainly shows that Congress intended to cut the state off from any exercise of authority on the subject, the state act

will prevail. Here we have the acts of appellant, taken in the exercise of the highest order of police power by the state, requiring the withdrawal of water from Lake Michigan to the amount of at least 10,000 cubic seconds feet, indirectly affecting, as it is claimed by appellee, interstate commerce by reason of the lowering of the surface elevations of the Great Lakes and their connecting channels. There is no claim that this obstruction of navigation—lowering the lake surfaces—absolutely stops interstate commerce, but merely inconveniences it or makes it slightly more expensive.

In

Hennington v. *Georgia, supra,*

the state's statute against the operation of any and all trains on Sunday absolutely stopped interstate commerce by railroad through the state one-seventh of the time. But, as the court said, this was not intended to be a direct burden upon interstate commerce, but was merely intended to express the will of the people of Georgia on the question of whether the Sabbath day should be observed in a certain manner, *and only incidentally affected interstate commerce.*

In

Crossman v. *Lurman*, 192 U. S. 189,

the constitutionality of the State Pure Food Law was upheld. There was also a federal act involving the same subject.

In

Plumley v. *Massachusetts*, 155 U. S. 461,

the oleomargine law was held constitutional, even though it operated indirectly as a burden upon interstate commerce.

Also see

In re Rahrer, 140 U. S. 545, 554.

In

Mutual Loan Co. v. *Martell*, 222 U. S. 225,

a state statute declaring invalid assignments of wages unless accepted by the employer and filed and recorded in a certain manner, was upheld, this court saying (p. 233):

> "Legislation cannot be judged by theoretical standards. It must be tested by the concrete conditions which induced it."

The repugnance of the Congressional Act must be direct and positive in order that the state's acts may be held invalid.

In

Cummings v. *Chicago*, 188 U. S. 410, 430,

the court, in speaking of this very question, said:

> "In the absence of such language, it should not be assumed that any such departure was intended"—
>
> *Savage* v. *Jones*, 225 U. S. 501.

In

Missouri, Kansas & Texas Ry. Co. v. *Haber*, 169 U. S. 613,

the state act with reference to the importation into the state of diseased cattle was upheld, although there was a federal statute pertaining to the same subject matter. This court said, (623):

> "May not these statutory provisions stand without obstructing or embarrassing the execution of the Act of Congress? * * * *A statute* enacted in the execution of a reserved power of the state is not to be regarded as inconsistent with an Act of Congress passed in the execution of a clear power under the Constitution, unless the repugnance or conflict is so direct and positive that the two acts cannot be reconciled or stand together."

In

Reid v. *Colorado*, 187 U. S. 137, 148,

the state cattle inspection law was upheld. This court said:

> "It should never be held that Congress intends to supersede, or by its legislation suspend the exercise of the

police powers of the states, even when it may do so, unless its purpose to effect that result is clearly manifested."

In

Sinnott v. *Davenport*, 22 How. 227,

the state's ship registration law was upheld. This court said, (243):

"* * * in the application of this principle of supremacy of an Act of Congress in a case where the state law is but an exercise of a reserve power, the repugnance or conflict should be direct and positive, so that the two acts could not be reconciled or consistently stand together; * * *"

In

Missouri Pacific R. R. Co. v. *Larabee Flour Mills Co.*, 211 U. S. 612,

this court said, (623):

"Running through the entire argument of counsel for the Missouri Pacific is the thought that the control of Congress over interstate commere, and a delegation of that control to a commission, necessarily withdraws from the state all power in respect to regulations of a local character. This proposition cannot be sustained. Until specific action by Congress or the Commission, the control of the state over these incidental matters remains undisturbed."

In

Missouri, Kansas & Texas R. R. Co. v. *Harris*, 234 U. S. 412, 418,

the court, in speaking of the powers of the Interstate Commerce Commission, as affecting state regulations, said:

"These cases recognize the established rule that a state law enacted under any of the reserved powers—especially if under the police power—is not to be set aside as inconsistent with an Act of Congress, unless there is actual repugnancy, or unless Congress has, at least, manifested a purpose to exercise its paramount authority over the subject. *The rule rests upon fundamental grounds that should not be disregarded.*"

In

Carey v. *State of South Dakota*, 250 U. S. 118,

a state statute relating to the shipment out of the state of migratory birds was upheld. This court said, (122):

> "It is, however, urged that Congress has manifested its intention to assume exclusive jurisdiction of the subject; and that the failure to make any provision in the Federal act concerning shipping evidences the purpose of Congress that the shipping of game birds shall not be prohibited. This argument rests upon the clause which declared that the migratory birds 'shall hereafter be deemed to be within the custody and protection of the government of the United States.' But that clause may not be read without its context; and the words immediately following show that the custody and protection is limited to prohibiting their being 'destroyed or taken contrary to regulations' which are to fix the closed seasons in the several zones. If, reading the Federal act as a whole, there were room for doubt, two established rules of construction would lead us to resolve the doubt in favor of sustaining the validity of the state law. *First*: The intent to supersede the exercise by a state of its police powers is not to be implied unless the act of Congress, fairly interpreted, is in actual conflict with the law of the State. *Savage* v. *Jones*, 225 U. S. 501, 533, 56 L. ed. 1182, 1194, 32 Sup. Ct. Rep. 715; *Missouri, K. T. & R. Co.* v. *Haber*, 169 U. S. 613, 623, 42 L. ed. 878, 881, 18 Sup. Ct. Rep. 488. *Second*: Where a statute is reasonably susceptible of two interpretations, by one of which it would be clearly constitutional and by the other of which its constitutionality would be doubtful, the former construction should be adopted."

In

Houston, East & West Texas Ry. Co. v. *U. S.* 234 U. S. 342,

(the *Shreveport cases*), the order of the Interstate Commerce Commission was upheld because it was clear and plain in such order that it was the intention to hold certain intrastate rates to be discriminatory against certain interstate rates, and the removal of this discrimination was unmistakably directed. However, in

Illinois Central R. R. Co. v. *Public Utilities Commission*, 245 U. S. 493,

this court did not permit the order of the Interstate Commerce Commission to override that of the Public Utilities Commission of Illinois for the reason that the order of the Interstate Commerce Commission was uncertain and indefinite, and did not clearly express an intention so to do.

The court said, (510):

"In construing Federal statutes enacted under the power conferred by the commerce clause of the Constitution the rule is that *it should never be held that Congress intends to supersede or suspend the exercise of the reserved powers of a state, even where that may be done, unless, and except so far as,* its purpose to do so is *clearly manifested.* * * * (Citing numerous cases.) This being true of an act of Congress, it is obvious that an order of a subordinate agency, such as the Commission should not be given precedence over a state rate statute otherwise valid, unless, and except so far as, it conforms to a high standard of certainty.

"We conclude that the uncertainty in this order is such as to render it inoperative and of no effect as to the intrastate rates established and maintained under a law of the state, and therefore that the suits by the carriers were rightly dismissed on the merits."

In

Sligh v. *Kirkwood,* 237 U. S. 52,

held the statute of Florida against offering for sale or shipment decayed fruits, valid. This court said:

(60) "Nor does it make any difference that such regulations incidentally affect interstate commerce, when the object of the regulation is not to that end, but is a legitimate attempt to protect the people of the state."

* * *

"and whether such regulation is necessary in the public interest is primarily within the determination of the legislature, assuming the subject to be a proper matter of state regulation."

In

Hammer v. *Dagenhart,* 247 U. S. 251,

which case involved the validity of the Child Labor Law, this court said:

(p. 273)

"The grant of power to Congress over the subject of interstate commerce was to enable it to regulate such

commerce, and not to give it authority to control the states in their exercise of the police power over local trade and manufacture.

"The grant of authority over a purely Federal matter was not intended to destroy the local power always existing and carefully reserved to the states in the 10th Amendment to the Constitution.

"Police regulations relating to the internal trade and affairs of the states have been uniformly recognized as within such control."

* * *

(p. 275)

"* * * The maintenance of the authority of the states over matters purely local is as essential to the preservation of our institutions as is the conservation of the supremacy of the Federal power in all matters intrusted to the nation by the Federal Constitution."

(p. 276)

* * *

"* * * This court has no more important function than that which devolves upon it the obligation to preserve inviolate the constitutional limitations upon the exercise of authority, Federal and state, to the end that each may continue to discharge, harmoniously with the other, the duties intrusted to it by the Constitution."

* * *

(p. 276)

"* * * Thus the act in a twofold sense is repugnant to the Constitution. It not only transcends the authority delegated to Congress over commerce, but also exerts a power as to a purely local matter to which the Federal authority does not extend."

With the language of the above case in mind, consider the situation of the people residing within appellant's territorial limits, and the geographical location of Chicago, with its ever-increasing activity in trade and commerce, situated, as it is, at the lower end of Lake Michigan. We have, on the one side, the immense transportation facilities of the Great Lakes connecting, through the St. Lawrence River and the Erie Canal with the Atlantic Ocean. Chicago is the gateway also to the great transportation system of the Mississippi River and its tributaries. This transportation system reaches ap-

proximately fourteen of the richest states of the Union— not only in the fertility of soil but in the production of minerals and manufactures. Chicago is one of the termini of practically all of the great railroad systems of the country. Almost forty years ago her population reached approximately 1,000,000 people—greater than is now the population of either Cleveland, Detroit, Buffalo or other great cities on the Lakes. Her only water supply was Lake Michigan. Unless her sewage and drainage could be diverted from Lake Michigan to the Illinois River, it was necessary that it be discharged either through the Chicago River or by means of sewers or otherwise into Lake Michigan. The only way that a pure water supply for this vastly increasing population could be obtained was by diverting the sewage and drainage from the Lake. The people of Chicago would have been derelict in their duty to the nation, to themselves and to posterity if they had not availed themselves of the only opportunity they had to provide a pure water supply. There are no cities of any size in the United States, except those cities located upon the shores of the Great Lakes, that are compelled to obtain a water supply from a source (the Lake) which also is the place into which the city is naturally drained. Chicago is the only one of these cities that had the opportunity to do what other cities of the United States of size do—namely, to obtain water from an unpolluted source and discharge sewage into streams that do not constitute a water supply for any considerable population. The Desplaines and Illinois Rivers have not been and are not a water supply for human beings.

Other large cities located on the shores of the Great Lakes are only, now, at this late date confronted with the problem that Chicago had forty years ago. The people of Chicago and environs proceeded to cause the construction by appellant of the works necessary for and provided for themselves a pure water supply at an expense of approximately a hundred million of dollars. The only objections that have ever been made to this plan have just recently arisen from navigation inter-

ests which operate ore-carrying vessels, and from the water power interests on the Niagara and St. Lawrence. This geographical situation of Chicago invited and required the protection of the water supply of the people of Chicago by diverting the sewage and drainage from Lake Michigan, with the necessary abstraction of water to accomplish that purpose. This whole problem is one of local concern. It can be best handled by local authorities whose interests are the securing of the proper results, and whose acts should be unquestioned. The effect upon navigable waters whether wholly within the state or outside is purely incidental, and, in fact, more helpful than harmful.

These facts lend further force to the proposition that the Act of Congress of March 3, 1899 and the action of the Secretary of War thereunder, shall not be deemed repugnant to the state acts unless the intention of Congress so to do is expressed in the very clearest language.

In the Child Labor Tax case,

Bailey v. *Drexel Furniture Co.*, 259 U. S. 20,

this court, in speaking of the principles here contended for, and so admirably stated in the numerous cases above cited, pointing out the necessity of adherence to them, said, (37):

> **"In the maintenance of local self-government, on the one hand, and the national power, on the other, our country has been able to endure and prosper for nearly a century and a half."**

It is thus apparent that Section 10 of the Rivers and Harbors Act of March 3, 1899, and the acts of the Secretary of War thereunder, cannot be construed as repugnant to the Illinois Act of May 29, 1889, and to the operation of the works of appellant built thereunder.

Charles Warren, in his work entitled

"The Supreme Court in United States" (1922), Vol. 3, page 464,

in speaking of this Court's attitude in cases involving the police power of the states, said:

> "It may fairly be said that the support which the court has thus given to the police power of the states has been

one of the most remarkable features of its career. Certainly a litigant who hopes to overturn the deliberate judgment of a State Legislature, as expressed in this form of legislation, has a very scanty hope of assistance from the court."

Again the author states (466):

"The doctrine which the court has finally worked out in deciding these constitutional cases may be summed up briefly as the recognition of 'the paramount right of public necessity.'"

(c) Congress has otherwise by legislation indicated that it was not its intention to prohibit the operation of appellant's diversion works, or that any act of any of its officers should have that effect.

We have in the statement of this case (p. 48) set forth various acts of Congress indicating that it was the Congressional intention that appellant's diversion should proceed as required by state law, unhindered; that no executive officer was empowered to limit it, and that if any regulation was to be made of this diversion, it would be done by Congress in the future.

In the very Rivers and Harbors Act of March 3, 1899 (Statement 49), containing Section 10, upon which appellee relies for the Secretary of War's authority, there is an item providing for a survey for the improvement of the Illinois and Des Plaines River *"with a view to the extension of navigation from the Illinois River to Lake Michigan at or near Chicago * * * in pursuance of and according to the recommendations in the report of January 27, 1897."* The report referred to was the one made by Major Marshall pursuant to a previous act of Congress. This report described in detail appellant's Sanitary and Ship Canal, its size and the purpose of diverting at least 600,000 cubic feet of water from Lake Michigan through it—that is, its capacity (Statement, p. 48).

Certainly it cannot be conceived, in view of the attitude of Congress as to the powers of the states over local matters,

particularly those matters affecting public health, that Congress intended by inference merely under Section 10 to delegate the regulation of appellant's works to an executive officer. These works had been constructed over a period of ten years, and the purpose of the construction was well known. The progress of the work had been reported to Congress almost yearly by means of the Chief of Engineers' reports. The purpose of Congress in requiring these reports was to obtain each year specific information with reference to the condition of navigable waters, in order to determine whether there were encroachments which might not be in accordance with the will of Congress. If it found that there were works being built that would operate as undesirable obstructions to navigation, it could and would have specially legislated. Some specific langauage would have been used indicating the clear intention of Congress that the Secretary of War should regulate this diversion, if that were the Congressional intention.

Congress followed this procedure with reference to the encroachments of the Chandler-Dunbar Water Power Co. in the St. Mary's River. It, in that case, specially legislated with reference to these various obstructions, canceling all permits and licenses in existence and directing the Secretary of War to take proceedings to remove these obstructions.

United States v. *Chandler-Dunbar W. P. Co.*, 229 U. S. 51.

The Rivers and Harbors Act of June 6, 1900, contained a provision for the continuing of the survey provided for by the Act of 1899 (specially mentioning appellant's Sanitary and Ship Canal)

> "for a channel 14 feet deep through said proposed route, and that said estimates cover and include a proper connection *at Lockport with the Sanitary and Ship Canal, which has been constructed by the Sanitary District of Chicago.*" (Statement p. .)

In the Rivers and Harbors Act of June 13, 1902, further survey was provided for

> "from Lockport, Illinois, by way of the DesPlaines and Illinois Rivers, to the mouth of the said Illinois River,

and from the mouth of the Illinois River by way of the Mississippi River to St. Louis". (Statement, p. 49.)

Section 4 of the same act provided for the establishment of the International Waterways Commission. This commission was to make a study of the conditions of all boundary waters upon which a treaty might be framed, and also

"upon the effect upon the shores of these waters and the structures thereon, and upon the interests of navigation by reason of the diversion of these waters from or change in their natural flow, and further to report upon the necessary measures to regulate such diversion and to make such recommendations for improvements and regulations as shall best serve the interests of navigation in said waters". (Statement, 50.)

The above quotation from the Rivers and Harbors Act, referred directly to the Chicago diversion. The International Waterways Commission understood that the clause referred to the Chicago diversion, for it made several reports regarding it, including the special report upon the Sanitary and Ship Canal and its operation of January 4, 1907. (Appellant's Narrative, 505.) This Commission found the diversion of 10,000 seconds feet to be an existing fact, and that in dividing the water of the Niagara River between the United States and Canada for electric power purposes, the United States should be charged with the 10,000 seconds feet diversion, and that the State of Illinois and appellant were entitled to that diversion. The treaty itself followed the recommmendations of the International Waterways Commission in practically every respect. It preserved to the State of Illinois this diversion.

On April 21, 1904, Congress passed a resolution authorizing the Secretary of War to permit appellant to cut down the crests of the government dams in the Illinois River. (Statement 51.) The only purpose of this was to remove an obstruction to the flow in the Illinois River, and to arrange the river so that it would better carry appellant's additional diversion;—that is, the diversion that was or would be made

possible by the work of excavating in the channels of the Chicago River and its branches under the permits of the Secretary of War of July 11, 1900.

The Act of Congress of June 29, 1906, for the preservation of Niagara Falls (Statement 51) provided in Section 1:

> "That the diversion of water from Niagara River or its tributaries, in the State of New York, is hereby prohibited, except with the consent of the Secretary of War as hereinafter authorized in section two of this Act; *Provided, That this prohibition shall not be interpreted as forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States under its direction.*"

The foregoing Act related to the preservation of Niagara Falls, which was being injured primarily by the use of the waters of the Niagara River for the development of water power. If the Rivers and Harbors Act of March 3, 1899, authorized the Secretary of War to regulate diversions of water, there would have been no occasion for the passage of this Act, for the Secretary of War could have regulated or limited diversions of water from the Niagara River for water power purposes under the 1899 Act as well as under the Act just quoted. Congress carefully by the proviso mentioned, indicates its intention that, under no circumstances, not even for the preservation of the scenic beauty of the Falls, shall the diversion at Chicago for domestic and sanitary purposes be affected, except as Congress may thereafter fix the amount. The words

> "or by the Secretary of War of the United States under its direction,"

mean that the Secretary of War may be *thereafter* directed how to fix that diversion. These words absolutely negative the idea that the Secretary of War was *then* authorized under any Act of Congress to fix the amount of the diversion. *No*

Act has been passed since authorizing the Secretary of War to limit or in any way affect the diversion for sanitary purposes.

Senator Lodge's statement in the United States Senate upon the report of the conferees concerning Senator Hopkins' amendment, leaves no doubt as to the intention of Congress as expressed by the proviso in Section 1 of said act for the preservation of Niagara Falls. It will be recalled that Senator Lodge said, as to his understanding of the meaning of the proviso and that of the conferees of the House and Senate—

> "The first section of the bill protects the right of Chicago." (Statement 53.)

The Rivers and Harbors Act of Congress of June 25, 1910, provided for a survey for the improvement of the waterway

> "from Lockport, Illinois, by way of the DesPlaines and Illinois Rivers to the mouth of said Illinois River",

and appropriated one million dollars for its construction. The Board of Engineers to be established, was to report

> "upon such measures as may be required to properly preserve the levels of the Great Lakes and to compensate, so far as practicable, for the diminished levels in said lakes and the connecting waters thereof, by reason of any diversion of water from Lake Michigan for the maintenance of the proposed waterway herein described, or diversion for any other purpose."

Here was a direct reference to the Chicago diversion. It speaks of a diversion for waterway purposes

> "or for any other purpose"

from Lake Michigan. There was and is no other diversion from Lake Michigan than the Chicago diversion. The Board of Engineers which was appointed under that act, made a report to Congress upon the diversion at Chicago and the means by which the surface elevations of the lakes could be restored. (Statement 71.) Certainly it is plain that it was not the intention of Congress that this abstraction of water from Lake Michigan for health purposes, should be limited or regulated. It is further clear that Congress did not under-

stand that by any previous act an executive officer had been empowered to frustrate the acts of the State of Illinois in the interest of the health of its people.

June 30, 1917, by resolution of Congress, the Secretary of War was authorized to cause a report to be made upon

> "the entire subject of water diversions from the Great Lakes and from the Niagara River, including nagivation, sanitary and power purposes". (Statement 55.)

The report was made. (Appellant's Narrative, p. 102.)

In

> *International Bridge Company* v. *People of State of New York*, 254 U. S. 126,

suit was instituted by the State of New York against the Bridge Company to collect certain penalties arising under a statute of New York of 1915 amending the charter of the International Bridge Company by directing that the bridge company construct a foot path across the bridge. The bridge was constructed under an act of the State of New York passed prior to 1870, and an act of Congress of 1870, authorizing the bridge company to construct a bridge across the International Stream, subject to plans being approved by the Secretary of War. Another act of Congress was passed later which found the bridge to be a lawful structure. There were reciprocal acts of Canada.

Was the Act of New York of 1915 providing for the foot path for the International Bridge valid? The court said:

> (131) "The only argument that impresses us, and the one that was most pressed, is that this is an international bridge, and that Congress has assumed such control of it as to exclude any intermeddling by the state. It is said that the bridge as constructed was and is devoted wholly to international commerce, and that when Congress authorized it in that form in 1874, that authority must be regarded as the charter under which it was maintained. Without repeating the considerations urged in support of this conclusion we will state the reasons that prevail with us. The part of the structure with which

we are concerned is within the territorial jurisdiction of the state of New York.

* * *

"Not only the existence of the company but its right to build upon New York land, came from New York, * * *.

* * *

"From an early date the state has been recognized as the source of authority, in the absence of action by Congress. * * * And this court has been slow to interpret such action as intended to exclude the source of rights from all power in the premises."

In

West Chicago Street R. R. Co. v. *People of Illinois*, 201 U. S. 505, 527,

this Court held that the approval of the Secretary of War was not necessary for the lowering of tunnels under the Chicago River as directed by an ordinance of the City of Chicago; and that Congress intended, by the Rivers and Harbors Act of March 3, 1899, that the work of "lowering tunnels," etc., to provide a twenty-one-foot depth in the Chicago River, should be done by Chicago,

"to give the assent of the United States to any work done by the City towards accomplishing the end which the Government had in view."

The lowering of the tunnels was part of the river enlargement work, under the July 11, 1900 permits, for appellant's 10,000 c. s. f. diversion through the Chicago River to the Sanitary & Ship Canal.

V.

APPELLEE HAS INVITED AND ACQUIESCED IN THE CONSTRUCTION BY APPELLANT OF ITS SANITARY AND SHIP CANAL TO DIVERT WATER FROM LAKE MICHIGAN TO THE AMOUNT REPRESENTED BY THE CAPACITY OF SAID CANAL. IT IS ESTOPPED NOW TO DENY THE RIGHT.

The Illinois and Michigan Canal as originally built was only a make-shift. It did not meet the ideas of the state and federal government for the creation of a waterway from Lake Michigan to the Illinois and Mississippi Rivers. As will be recalled from the statement of the case herein, hardly had the old Illinois and Michigan Canal been opened, than a demand immediately arose for its enlargement and for the diversion of water from Lake Michigan not only to operate the enlarged canal, but to furnish better navigable facilities on the Illinois River. The resolution of Illinois General Assembly of 1861, the Congressional Act for the survey of waterway of 1866, the provision for the other surveys following, are all important. The surveys made prior to the passage of the Act of May 28, 1889, all recommended that the waterway be improved by the building of an enlarged canal with the diversion of water to operate it. (Statement, p. 19.)

After the Act of May 29, 1889, was passed, the surveys and reports, as well as the congressional acts requiring them, looked to the utilization of appellant's Sanitary and Ship Canal, its adjuncts and the attendant diversion for a waterway, and also to the making of provisions for the restoration of lake levels by compensating works. (Statement, p. 34.)

The appellant expended upwards of seventy-five millions of dollars on the faith of the acquiescence in and the invitation extended for the building of the Sanitary and Ship Canal and its various adjuncts.

In

United States v. *Pennsylvania & Lake Erie Dock Company*, 272 Fed. 839, (C. C. A. Sixth Circuit), action of ejectment was brought by the United States to recover possession of a strip of land used as a pier by the defendant company. The Court found as facts: (*a*) That the government in the exercise of its paramount power over navigation had, in 1827, constructed a pier on part of the territory now in controversy; (*b*) That up to 1838, the government did expend money upon the maintenance of the pier; (*c*) That after 1838, the government did not expend any money upon the maintenance and repair of the south portion of the pier; (*d*) That the defendant company made application to the War Department for permission to encroach on the harbor line at the points indicated on a map submitted with the application; (*e*) That no objection and no claim was at that time made by the government to the submerged land; (*f*) That the defendant company made large expenditures for the concrete dock.

THE COURT HELD: That the evidence sustained the findings of the lower court; that the government had abandoned by failure and neglect, its right to the property in controversy saying:

> (848) "Regardless of whether the change in harbor lines was to be north or south of Second Street, the application and accompanying map fully informed the plaintiff of the purpose of the defendant to construct this concrete dock 15 feet wide upon this particular location. If the government then made any claim whatever to this property, it should then have asserted that claim, instead of delaying until after this defendant had expended large sums of money in the construction of this concrete dock; but it did nothing of the kind. On the contrary, it not merely passively, but by granting this permission for a change of harbor line, it actually, consented to the construction of this dock. It not only made no claims to this property at that time, but by its action induced the defendant to believe that it had no such claim, and that it had abandoned the exercise of its dominant power to construct and maintain a pier at this location.

The War Department was, by the Act of June 13, 1902, clothed with full authority to determine whether it would or would not maintain a pier along this portion of the water front, and it would seem that by this act alone, if by no other, the government must be held to have abandoned this particular site, or at least to have estopped itself from now claiming that it had not done so.

* * *

"In the case of *United States* v. *Stinson*, 197 U. S. 200-204, 25 Sup. Ct. 426, 49 L. Ed. 724, the Supreme Court held that, 'while laches or limitations do not of themselves constitute a distinct defense as against an action by the United States to assert a right in property,' nevertheless it affirmed the judgment of the lower court in that case, which judgment was based upon the declaration that 'the substantial consideration underlying the doctrine of estoppel applies to the government as well as to individuals.' Applying this doctrine to the facts of this case, in connection with the presumption that the United States government intended to act fairly in its dealings with its citizens, the finding of the trial court that the plaintiff had abandoned this part of the east pier and the location upon which it rested is sustained by competent evidence."

United States v. *Board of Commissioners of Osage County*, 254 Fed. 570, 573.

United States v. *Debell*, 227 Fed. 775, 779 (C. C. A., 8th Circuit).

United States v. *Midway Northern Oil Company*, 232 Fed. 619, 631.

The above cited cases enunciated the principle that

"It derogates from the dignity and character of the government to suppose that, formed as it is to secure impartial justice between individuals, it may nevertheless, in the conduct of its own affairs, without regard to the principles it represents, perpetrate upon its citizens wrongs which it would promptly condemn if practiced by one of them upon another."

United States v. *Chandler-Dunbar W. P. Co.*, 152 Fed. 41, 81.

In

Monongahela Navigation Company v. *United States*, 148 U. S. 312,

which was a proceeding by the government to condemn certain lands, the Court said (p. 334):

"* * * in this case there was not only the full authority of the State of Pennsylvania, but also so far as respects this particular lock and dam they were constructed at the instance and *implied invitation of Congress.* The Act of March 3rd, 1881, making appropriations for the improvement of the river in terms provided that no such improvement should be made until the * * * company had in good faith started upon the building of this lock and dam. * * * This is something more than the mere recognition of an existing fact; it *is an invitation to the company to do the work; and when in pursuance of that* invitation, and under authority given by the State of Pennsylvania, the company has constructed the lock and dam, it does not lie in the power of the state or *the United States to say that such lock and dam are an obstruction and wrongfully there,* * * *."*

In

Hemmer v. *United States*, 204 Fed. 898 (8th C. C. A.),

a suit was instituted by the United States for the purpose of setting aside certain conveyances which had been made under the Indian Homestead Law on the ground that a statute passed subsequently to the one under which the original homesteader had acquired his land had prolonged the restriction of alienation to twenty-five years, though it had been but five years before the passage of the Act. At page 901 the Court said:

"This is a suit in equity. In such a suit the claims of the government appeal to the conscience of the chancellor with no greater or less force than those of a private individual under similar circumstances. (Citing cases.)"

In

State of Iowa v. *Carr*, 191 Fed. 257 (8th C. C. A.),

there was an appeal by defendants in a suit to quiet title to a certain piece of land which had formed in a river. The

facts showed that complainant had occupied the land for a long period of time and had made improvements and paid taxes thereon without objection from either the state or the other complainants. At page 266 the Court said:

> "The equitable claims of a state or of the United States appeal to the conscience of a Chancellor with the same, but with no greater or less force than would those of an individual under the circumstances. (Citing cases.)"

The improvement of the critical points of navigation in the Great Lakes was fixed six inches lower by reason of the Chicago diversion. This improvement is known as the "1903 project" (Appellant's Narrative, p. 155). The table (Appellant's Narrative, p. 162) shows the project depths of the various improvements in the channels and harbors, where sail the large ore-carrying boats which claim to have been affected in their carrying capacities. This table also shows the actual depths of water which obtained up to the year 1922, at low water times. An examination of this table demonstrates that at no time was the depth of water less than the project depths. In fixing the reference plane lower for these various improvements because of the Chicago diversion, the Government accepted it as an existing fact, and Congress thereby not only acquiesced, but actually consented to the diversion and whatever effect it might have upon the lakes. It will be remembered that on August 16, 1895, the Board of Engineers reported to the Secretary of War on the subject of the effect of the diversion of 10,000 seconds feet, and in 1898 to 1900 deductions were made by the Lake Survey of the United States as to the effect of this lowering. The report of 1895, and the deductions made by the United States Lake Survey indicated that the effect on Michigan and Huron would be approximately six inches.

Appellant excavated the channels of the Chicago River and its branches to provide for a diversion of 10,000 seconds feet through them to its Sanitary and Ship Canal. If it were not going to abstract more than 4,167 seconds feet, all this work

was unnecessary. It also built, on the faith of the permits of July 11, 1900, for the excavation in said channels, intercepting sewers, North Shore and Calumet Sag Channels, pumping stations and other works. On the principle of the cases cited, appellee cannot now be heard to say that appellant has not the right. No intimation was given to appellant that the right was denied until after the work was done. The purpose of this expenditure was well known to appellee.

The force and effect of the treaty between the United States and Great Britain of January 11, 1909, relating to Canadian boundary waters and the reports of the International Waterways Commission recommending its terms.

As before stated, the International Waterways Commission, in its reports of May 3, 1906 (Appellant's Narrative, p. 104), and January 4, 1907 (Appellant's Narrative, p. 505), found and recommended that there should be allowed at Chicago a diversion from the Great Lakes system, at least 10,000 cubic seconds feet of water. In dividing the water for diversion at Niagara Falls for power purposes between the United States and Canada, the United States was charged with the 10,000 seconds feet Chicago diversion. In other words, it was agreed that Canada might, under the treaty, divert some 16,000 seconds feet at Niagara Falls more than the United States, because of this Chicago diversion. When the treaty was made, the right to divert this water by appellant and the State of Illinois was recognized. That right was not in any respect curbed. The treaty expressly eliminates from its terms by the preliminary article, Lake Michigan, as follows:

> "For the purposes of this Treaty boundary waters are defined as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including *tributary waters which in their natural channels would flow into such lakes, rivers, and*

waterways, or waters flowing from such lakes, rivers and waterways, or the waters of rivers flowing across the boundary."

Obviously, Lake Michigan is not a boundary water, as defined by the Treaty.

Article II of the Treaty reserves to each of the parties, or to the state governments, or provincial governments, as the case may be, all rights over these nonboundary waters, as follows:

> "Each of the High Contracting Parties reserves to itself, or to the several State Governments, on the one side, and the Dominion or Provincial Governments on the other, as the case may be, subject to any Treaty provisions now existing with respect thereto, the exclusive jurisdiction and control over the use and diversion, whether temporary or permanent, of all waters on its own side of the line which in their natural channels would flow across boundary or into boundary waters; but it is agreed that any interference with or diversion from their natural channels of such waters, on either side of the boundary resulting in any injury on the other side of the boundary, shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion or interference occurs; but this provision shall not apply to cases already existing, or to cases expressly covered by special agreement between the parties hereto.
>
> It is understood, however, that neither of the High Contracting Parties intends by the foregoing provision to surrender any right which it may have to object to any interference with or diversions of waters on the other side of the boundary, the effect of which would be productive of material injury to the navigation interests on its own side of the boundary." (Appellant's Narrative, p. 531.)

And again in Article III it is stated:

> "* * * nor are such provisions intended to interfere with the ordinary use of such waters for domestic and sanitary purposes." (Appellant's Narrative, p. 532.)

Article VIII expressly provides that the uses for domestic and sanitary purposes shall be paramount. (Appellant's Narrative, p. 535.)

The Treaty thus completely protects the diversion at Chicago. There was no dispute between the United States and the Dominion of Canada as to the right to divert 10,000 cubic seconds feet of water from Lake Michigan at Chicago. The International Waterways Commission, which was composed of representatives of the two governments, settled that. The two reports mentioned, those of May 3, 1906, and January 4, 1907, were signed by all the members of the Commission—three from the United States and three from Canada. As to the diversion at Chicago, the only question remaining unsettled was whether there should be diverted by the State of Illinois and appellant, at Chicago, more than 10,000 cubic seconds feet of water. The purpose is stated, in the treaty itself, to be—

> "* * * *to settle all questions which are now pending* between the United States and the Dominion of Canada involving the rights, obligations or interests of either in relation to the other or to the inhabitants of the other along their common frontier, * * *"

Article II thus left unhampered the power of the sovereign over the waters that were not boundary waters within the sovereign's territory, subject only—

(1) to the right of the citizens of one country to sue in the courts of the other country for damages as to any caused by a diversion not then existing;

(2) to the right merely of either party to object to further diversions than those which existed, the effect of which diversions would injure navigation.

The Chicago diversion to the amount of 10,000 seconds feet was found by International Waterways Commission to be an existing diversion, as follows:

> "It (the Commission) does not desire an investigation of the effect upon the navigation interests of the Great Lakes. It has satisfied itself upon that point. Nor does it wish to reopen the case of the Chicago Drainage Canal as designed in the bill. It accepts that as a fixed fact, with its attendant diversion of 10,000 cubic feet per second through the Chicago River." (Appellant's Narrative, p. 522.)

The right to the sovereign having jurisdiction over Lake Michigan, a non-boundary water, subject to the conditions mentioned, was thus reserved. As to those waters, the sovereign could do anything with them it chose.

In

The Schooner Exchange v. *McFaddon*, 7 Cranch 116,

Chief Justice Marshall stated the rule to be (p. 136):

> "The jurisdiction of the nation within its own territory is necessarily exclusive and absolute. It is susceptible of no limination not imposed by itself. Any restriction upon it, deriving validity from an external source, would imply a diminution of its sovereignty to the extent of the restriction, and an investment of that sovereignty to the same extent in that power which could impose such restriction.
>
> All exceptions, therefore, to the full and complete power of a nation within its own territories, must be traced up to the consent of the nation itself. They can flow from no other legitimate source."

See also opinion of Judson Harmon on right of United States in Rio Grande, 21 Opin. Atty. Gen. 274, 280.

This we understand is the accepted rule of international law and is recognized by the treaty.

The waters which are diverted from Lake Michigan at Chicago are wholly within the limits of the State of Illinois. The boundary line of the State extends due north into Lake Michigan from the intersection of the shore of the Lake with the boundary between Indiana and Illinois to a point where it is met by the boudary line between Wisconsin and Illinois extended due East.

The treaty between the United States and Great Britain, of 1909, ratified by the Senate is the law of the land, and may properly be said to have been made, so far as the Chicago diversion is concerned, for the benefit of the State of Illinois and the appellant. Such being the case, the State or appellant may compel the recognition of such contract right. The Treaty reserved the right of the sovereign—and the state is

a complete sovereign except as to those things delegated to the Federal Government—over these waters. Article II begins—

> "Each of the high contracting parties reserves to itself, or to the several State Governments—"

the right of the sovereign over the nonboundary waters. There was thus recognized the right of the state government as a sovereign to divert or use non-boundary waters. This construction is borne out by the provisions of Article V of the Treaty relating to the diversions at Niagara Falls, wherein it is provided:

> "The United States may authorize and permit the diversion within the State of New York of the waters of the said river above the Falls of Niagara, for power purposes, not exceeding in the aggregate a daily diversion at the rate of 20,000 cubic feet of water per second."

The Niagara River at this point is an international stream and a boundary water, and the makers of the Treaty took this fact into consideration and made it a condition of the diversions at Niagara Falls that the *United States itself* should *first* "authorize and permit" them.

At least the United States, by making the Treaty, must be construed to have acquiesced and consented to the conditions of the diversions as they existed at the time it was made, unless some definite action were taken by Congress indicating a different intention. Not only has Congress not indicated any such contrary desire, but, on the other hand, has taken action June 25, 1910, and June 30, 1917 looking towards making provision for the maintenance of the surface elevations of the lakes, as they would be if the diversions did not exist. This includes not only the Chicago diversion for sanitary purposes, but all other diversions, even for navigation and power purposes. Of course, Canada is not in a position to even object to the diversion to the amount of 10,000 seconds feet at Chicago.

VI.

THE DECREE OF THE LOWER COURT IS BASED SOLELY UPON THE TESTIMONY OF EXPERT WITNESSES. NO WITNESS WAS PRODUCED BY APPELLEE TO TESTIFY THAT THE LOWERING OF THE LAKE SURFACES OR DAMAGE TO COMMERCE, WAS EVER ACTUALLY OBSERVED. APPELLEE'S CASE DEPENDS ENTIRELY UPON AN INFERENCE OF THE UNSEEN AND THE SUBTLE ANALYSES OF EXPERT WITNESSES, WHICH CANNOT FORM THE BASIS OF AN INJUNCTIONAL DECREE.

(a) Expert evidence in injunction cases.

In the statement (p. 64) we have set forth the method by which appellee's expert witnesses sought to establish the basis for this injunction. Measurements were made of the discharge at different times of the outlet rivers of the different lakes, such as Huron, Erie and Ontario. The discharge measurements were plotted and by means of these plottings an increment, that is the increase or decrease of the flow of the outlet river due to one foot of change of the surface elevation of the controlling lake, was sought to be deduced. It was then assumed that the Chicago diversion would have a lowering effect upon the lake surface due to the fraction of a foot resultant from dividing the amount of the diversion by the increment. But the determination of this increment depended upon the accuracy of many things done and upon the correctness of the premises upon which the conclusion was based. In these plottings a discharge measurement made at a certain time in an outlet river many miles below the lake's outlet, depended upon whether the particular discharge was referred to the correct elevation of the lake. A time interval was assumed so that if, say, a particular discharge measurement was made at 11:00 o'clock upon a certain day, it was assumed that 10, 15, 20 or 25 minutes prior to that time, the surface elevation of the lake as appeared by the

recording gauge influenced that particular discharge measurement. The fixing of the time interval was based upon conjecture. It was found that the government witnesses as to the time necessary to create a change of flow throughout the Drainage Canal, were entirely wrong, as the tests showed. The result of these tests was never questioned. Also, it appears that the surface elevation of the lakes is constantly changing as much as six inches to several feet in a few minutes or hours. But no one testified to observing any lowering effect. On the contrary, it appeared that the mean elevation of the different lakes involved for the ten years immediately subsequent to the opening of the Drainage Channel, was higher than the mean for the ten years immediately preceding.

The next steps in appellee's program for the determination and showing of injury to navigation and commerce, was to assume that the lake surfaces would be thus lowered by 5 to 6 inches for Huron and Michigan for 10,000 seconds feet diversion, and in smaller amounts for Erie and Ontario, and that certain boats navigating the Great Lakes would be deprived of that number of inches of draft. Of course, on appellee's own theory the total number of inches of lowering the surface elevation of Lake Michigan, here involved, cannot be over three inches. They admit appellant has the right to divert 4,167 seconds feet. So the effect upon the lake surface of the difference between that amount and 10,000 seconds feet is the one to be considered here. It was estimated that for each inch of lowering, there would be a loss of 80 to 100 tons in the amount a vessel affected would carry each trip. But there were a number of difficulties in reaching this result, even if the first assumption were correct as to the reduction in surface elevations of the lakes. No one testified to observing a loss in the amount the boats actually carried. The expert witnesses concluded that they would be deprived for each trip of the amount mentioned. But it appeared that boats could not load within such narrow limits as the few inches involved. The lakes were changing, as

stated, constantly. Lake Erie would change sometimes as much as 8 feet in a few hours. Lake Michigan and Huron almost as much. A perusal of the hydrograph of the Great Lakes (Appellant's Narrative, p. 125) shows continuous yearly fluctuations of a foot or more. The hourly readings, as shown by the plat attached to the report of the Board of Engineers on Waterway from Utica to the Mouth of the Illinois River (Appellant's Narrative, p. 150), shows these oscillations due to barometric pressure or seiches. Further, the evidence showed that the channels traversed by boats should be of a depth so that there would be at least two feet of water beneath them. (Appellant's Narrative, p. 150.) A few inches, such as involved here, is of no importance.

So we find that appellee's evidence starts with the conclusion of expert witnesses and goes no further and ends with the request that, upon such conclusions and an inference of the unseen, the injunctive relief should be ganted.

In

Missouri v. *Illinois*, 200 U. S. 496, 523,

this Court recognised the principle that injunctive relief would not be granted upon this sort of evidence. The question involved there was whether the sewage discharged by appellant into the Illinois River, carried disease to the Mississippi River, the water supply of St. Louis. Plaintiff's witnesses in that case were experts, and it was upon their conclusions that the injunction was sought. This Court, in stating the reliance to be placed upon this kind of evidence, said:

> "There is nothing which can be deducted by the unassisted senses,—no visible increase of filth, no new smell. * * * The plaintiff's case depends upon an inference of the unseen. * * * The experts differ as to the time and distance within which a stream would purify itself. No case of an epidemic caused by an infection at so remote a source, is brought forward, and the cases which are produced are controverted."

This case was cited and the opinion quoted in full in

Joyce on Nuisances, 1906 Ed., Sec. 299.

The same author, at Section 420, states the rule—

"The nuisance must be actual and existing and not future, however strongly the apprehension of injury may be supported by scientific evidence."

In

Salvin v. *North Brancepeth Coal Company*, L. R. 9, Chanc. Appeals, 705,

a bill was filed to prevent the Colliery Company from erecting or using any coke ovens or other ovens to the nuisance of the plaintiff, the nuisance alleged being from smoke and deleterious vapors. Sir William M. James, in rendering his opinion, said:

(709) "When the Masters of the Rolls said that the damage must be visible, it appears to me that he was quite right; and, as I understand the proposition, it amounts to this, that, although when you once establish the fact of actual substantial damage it is quite right and legitimate to have recourse to scientific evidence as to the causes of that damage, still if you are obliged to start with scientific evidence, such as the microscope of the naturalist, or the tests of the chemist, for the purposes of establishing the damage itself, that evidence will not suffice. The damage must be such as can be shown by a plain witness to a plain common juryman.

The damage must also be substantial, and it must be, in my view, actual; that is to say, the Court has, in dealing with questions of this kind, no right to take into account contingent, prospective, or remote damage. I would illustrate this by analogy. The law does not take notice of the imperceptible accretions to a river bank or to the seashore, although after the lapse of years they become perfectly measurable and ascertainable; and if, in the course of nature, the thing itself is so imperceptible, so slow, and so gradual as to rquire a great lapse of time before the results are made palpable to the ordinary senses of mankind, the law disregards that kind of imperceptible operation. So, if it were made out that every minute a millionth of a grain of poison were absorbed by a tree, or a millionth of a grain of dust deposited upon a tree, that would not afford a ground for interfering, although after the lapse of a million minutes the grains of poison or the grains of dust could be easily detected."

See also

North Dakota v. *Minnesota,* 68 Law. Ed. 159 (Advance sheets Jan. 1, 1924).

Commerce upon the Great Lakes has gone on apparently unimpeded, and each year has shown an increase in the amount of tonnage carried by boats. In fact, all the great ore carrying vessels claimed to be damaged, have been built since the Drainage Canal was opened.

(b) Disregarding all questions heretofore presented as to the right of appellant to operate its works with the diversion required, nevertheless the injunction decree should not have been entered unless the injury and damage to commerce was material and the obstruction to navigation was unreasonable.

In

United States v. *Rio Grande Irrigation Company,* 174 U. S. 690,

a bill was filed to restrain the construction of a dam across the Rio Grande River in that portion of the river in New Mexico which was not navigable. It was claimed that this dam would impound the waters in such manner that it would affect the navigable capacity of the Rio Grande River lower down in its navigable portions. The Court refused the injunction. This Court held that it was necessary for the Government to show a substantial interference with navigation, and said (709):

> "• • • it becomes a question of fact whether the act sought to be enjoined is one which fairly and directly tends to obstruct (that is, interfere with or diminish the navigable capacity of a stream) • • • The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact."

This Court ordered:

> "• • • an inquiry into the question whether the intended acts of the defendants in the construction of a dam and

in appropriating the water of the Rio Grande will substantially diminish the navigability of that stream within the limits of present navigability, * * *"

Corrigan Transit Company v. *Sanitary District*, 137 Fed. 851, 857.

Lake Shore & Michigan Southern Railway Company v. *Ohio*, 173 U. S. 285, 294.

Cummings v. *Chicago*, 188 U. S. 410, 428.

Union Bridge Company v. *U. S.*, 204 U. S. 364, 365, 385, 400.

The above cases show that the only things with which the courts are concerned, in protecting navigable waterways of the United States, are unreasonable obstructions.

(c) It must appear in a case of this character, considering the parties involved, that an unreasonable obstruction and damage to commerce clearly exist before an injunction will issue.

In the recent case of

New York v. *State of New Jersey & Passaic Valley Sewage Commissioners*, 256 U. S. 296,

where New York instituted suit to enjoin the defendants from discharging sewage into New York Bay, injuring navigation thereon, this Court said (p. 309):

"With the record in this state we come to consider the evidence introduced, but subject to the rule that the burden upon the State of New York of sustaining the allegations of its bill is much greater than that imposed upon a complainant in an ordinary suit between private parties."

In

Kansas v. *Colorado*, 206 U. S. 46,

Kansas brought sought to enjoin Colorado from diverting the waters of the Arkansas River for irrigation purposes. It was claimed that this diversion seriously injured the people

of Kansas, and that Colorado had no right to such diversion. This Court, in summing up its conclusions, stated (p. 117):

> "* * * that the result of that appropriation has been the reclamation of large areas in Colorado, transforming thousands of acres into fertile fields, and rendering possible their occupation and cultivation when otherwise they would have continued barren and unoccupied; that while the influence of such diminution has been of perceptible injury to portions of the Arkansas Valley in Kansas, particularly those portions closest to the Colorado line, yet, to the great body of the valley it has worked little, if any, detriment, and regarding the interests of both States, and the right of each to receive benefit through irrigation and in any other manner from the waters of this stream, we are not satisfied that Kansas has made out a case entitling it to a decree."

See also

Attorney General v. *Mayor, Alderman and Corporation of Kingston-on-Thames,* 13th Weekly Reporter, 1863-1865, 888.

In

Mississippi & Missouri R. R. Co. v. *Ward,* 2 Black 485,

Ward charged the railroad with having created a nuisance by erecting a bridge across the Mississippi River at Rock Island, and prayed that it be abated as a nuisance (p. 495):

> "Then again, the obstruction to navigation must be plainly a nuisance within this rule before it can be removed by decree. If the proceeding was by indictment, and the jury doubted whether the obstruction was a nuisance or not, they would be instructed to acquit the defendant; and so, if this case was referred to a jury to try the fact and they doubted, they would be bound to acquit. And the same rule applies in a court of chancery where the Court ascertains the fact of nuisance. 2 Story, Com. on Eq., 203, 204."

VII.

A COURT OF EQUITY IN DETERMINING WHETHER OR NOT IT WILL GRANT AN INJUNCTION LOOKS NOT ONLY TO THE NAKED LEGAL RIGHTS OF THE COMPLAINANT AND THE ADVANTAGES TO BE BY IT GAINED, BUT ALSO TO THE INCONVENIENCES AND INJURIES TO BE SUSTAINED BY THE DEFENDANT. AND IF IT APPEARS THAT THE GRANTING OF THE INJUNCTION WOULD CAUSE COMPARATIVELY GREATER INJURY TO THE DEFENDANT THAN IT WOULD CAUSE BENEFIT TO THE COMPLAINANT, A COURT OF EQUITY WILL NOT HESITATE TO DENY THE RELIEF.

The above proposition is the rule in suits for injunctions between private persons. Where the parties are public bodies and represent the interests of the public, the Court should be meticulous in observing the rule and especially where the great question of the protection of the public health is involved. Here, as is shown by the undisputed facts, the injunction can have but one result—the immediate pollution of the only water supply for Chicago. If all the artificial purification and filtration works that could be installed, at a time in the future impossible now to determine were now in existence, still with the limitation of withdrawal to 4,167 cubic seconds feet, or materially less than 10,000 seconds feet, the Lake Michigan water supply would be polluted. There is no means by which, with such purification works in existence, an effluent from them can be prevented from finding its way at numerous times during the year into Lake Michigan. This effluent would carry disease germs. This results from the fact that the Chicago River and its branches cannot be kept reversed at all times unless there is allowed a continuous flow through them of at least 10,000 cubic seconds feet of water. This flow of water cannot be obtained except from Lake Michigan. In 1914, when the tests were made, it

was found that the volume of flow through the drainage channel and the Chicago River and its branches to the lake could not be increased from 4,167 seconds feet to 10,000 seconds feet, the maximum drainage run-off, within a period of less than twenty-four hours. This would be too late. The water would pile up in the channels of the river in from three to four hours in case of storm on this area and would flow into the lake carrying the sewage pollution. (Appellant's Narrative, p. 390.) The frequency of such occurrences increases and the danger to the water supply is more imminent as the paved and sewered area of the Chicago River basin is extended. That would be the condition even if Chicago and its environs had now installed these vast sewage and water purification works. How much more aggravated would the condition be with practically none of the sewage purified. The result of this decree would be the immediate cutting down of the flow from 10,000 cubic seconds feet, which now exists, to the limited flow of 4,167 seconds feet. The condition of nuisance in the Chicago, DesPlaines and Illinois Rivers would be intolerable. Lake Michigan would be polluted. Typhoid fever would exist and ever increasing epidemics would follow.

10,000 cubic seconds feet diversion from Lake Michigan will dilute the sewage of 3,000,000 people; 12,000 cubic seconds feet 3,600,000 people; and 14,000 cubic seconds feet 4,200,000 people. The cost of artificially treating the sewage of the difference between that population which would be oxidized by 4,167 cubic seconds feet of diversion and that population that would be oxidized by 10,000 cubic seconds feet is $183,510,507.00. The cost of artificially treating the sewage of the difference between that population which would be oxidized by 4,167 cubic seconds feet of diversion and that population which would be oxidized by 12,000 cubic seconds feet in $220,141,100.00. And the cost of artificially treating the sewage of the difference between that population which would be oxidized by 4,167 cubic seconds feet of diversion and that by 14,000 cubic seconds feet would be $256,958,800.00. (Appellant's Narrative, p. 217.) This would leave still untreated the

sewage that would be oxidized by 4,167 cubic seconds feet, which sewage would have to be treated if the diversion were limited to that amount, so that no raw sewage would go into Lake Michigan. The cost of sewage purification works to take care of this amount must also be added, which would be approximately $75,000,000.00. First, however, the wastes and the sewage from the increase of population in the period ending with the year 1945 must be treated. The resources of appellant will not permit this before the year 1945. The cost is upwards of one hundred million dollars. A like sum would have to be expended for water filtration plants, also, by the cities and towns furnishing water to the consumer. (Statement, p. 79.) And we would not then have a situation as to the water supply, approaching the conditions that prevail today, with all the sewage and drainage kept away from Lake Michigan. In such instance an effluent from these purification works would be discharged, at times, into the lake. Instead of Chicago having an unpolluted water supply, it would then have a polluted one, with constant danger of epidemics of typhoid fever and other water-borne diseases.

On the other hand, the benefit of this injunction to the appellee or to commerce on the Great Lakes, as has been heretofore stated, is problematical. Granting all that appellee claims, it is slight compared with the inconvenience, money expenditure, damage, danger to health and creation of nuisances that would result to appellant upon the enforcement of the injunction in any form.

In

Volume 1, Joyce on Injunctions, Sec. 20, p. 41,

it is said:

> "And an injunction will not be granted when the injury complained of is slight compared to the inconvenience to the defendant and the public that would result from granting the injunction."

Again at Sec. 25, p. 50:

> "Where the rights of the parties are at all doubtful the court applied to for an injunction should look at the

balance of convenience, and act upon the consideration of the comparative inconvenience which may arise from granting or withholding the injunction."

In

Kansas v. *Colorado*, 206 U. S. 46, 117,

this Court recognized the principle stated.

In

Georgia v. *Tennessee Copper Co.*, 206 U. S. 230,

a suit was instituted by the State of Georgia against a corporation, a citizen of the State of Tennessee, to enjoin the discharge of noxious gasses from their works in Tennessee over large tracts of territory in Georgia. The Court recognized the principle for which we contend, and, in speaking of the character of the action of the State in seeking the injunction, said (p. 237):

"It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air."

The Court, in granting the injunction, did so reluctantly, because it would have the effect of very seriously injuring the defendant's works. It was recognized that where the public health of the people of the State of Georgia was so directly involved, the different equities of the defendant would not be so carefully weighed. The converse, of course, of that must follow. Here the protection of the health of the people residing within appellant's limits is concerned—almost half of the population of the State of Illinois. On the other side, there is only the question of possible, remote or, at most, indirect damage to commerce.

This rule was recognized also in

Dun v. *Lumbermen's Credit Assn.*, 209 U. S. 20.

In

McCarthy v. *Bunker Hill & Sullivan Mining & Concentrating Co.*, (C. C. A. 9th Circuit), 164 Fed. 927,

a suit was instituted to enjoin the mining company from discharging its tailings into a stream. It appeared that the

benefit to the plaintiff would be slight, and that the damage to the defendants and its employees would be great. The Court said (940):

> "To an injunction, however, even on final hearing, no one has an absolute and unqualified right. Such an application appeals to the conscience of the chancellor, to the exercise of a wise and sound discretion, and should be granted or withheld according to the equities of the case as made to appear by the record. Each case must be considered and made to depend upon its own particular facts and circumstances, in the consideration and determination of which the general rules governing courts of equity are to be borne in mind and applied."

In

City of New York v. *Pine*, 185 U. S. 93,

suit was instituted to enjoin the City of New York from maintaining a dam on the West branch of the Byram River and diverting the waters from their natural flow through the plaintiff's farms. This Court assumed, as was found by the lower court, that the plaintiffs would suffer substantial damage and, besides, that they have the legal right to the natural flow. It was held that the decree enjoining the City of New York should not be sustained because of the damage that would result thereby to that city, and considered the greater equities in the City of New York (p. 97):

> "* * * *a municipality undertaking a large work with a view of supplying many of its citizens with one of the necessities of life.*"—

namely, a pure water supply.

VIII.

THE STATEMENT MADE BY THE SECRETARY OF WAR (JANUARY 8, 1913) IN REFUSING TO REMOVE THE ALLEGED LIMITATION BY THE ORDER OF DECEMBER 5, 1901 (4167 SECONDS FEET WITHDRAWAL) AND DENYING EXPRESS AUTHORITY TO APPELLANT TO DIVERT 10,000 CUBIC SECONDS FEET, IS IMMATERIAL. THE STATUTE DOES NOT AUTHORIZE ANY FINDINGS OR CONCLUSIONS BY THE SECRETARY OF WAR. IF IT DID, THE CONCLUSIONS WOULD BE SUBJECT TO REVIEW. IN ANY EVENT, THE CONCLUSIONS OF FACT AND OF LAW STATED, ARE ERRONEOUS, AS APPEARS BY THE RECORD OF THE CASE.

(a) The statute does not authorize the Secretary to make any findings or conclusions. If it did, such would be subject to review.

It will be recalled that on February 5, 1912, appellant asked that the limitation of the December 5, 1901 order be removed. At that time appellant had completed the work of excavating, expressly authorized by the Secretary of War and recommended by the Chief of Engineers under the July 11, 1900 permits, whereby the channels of the Chicago River and its branches had been deepened and widened, so that they would properly permit a flow of water through them equal to 10,000 cubic seconds feet. Appellant then had complete authority for the diversion to that amount, as we have showed. A limitation placed upon the withdrawal at a time before appellant had completed the excavation in the channels of these rivers had no force or effect. However, as the limitation remained unchanged, notwithstanding the work thereafter done, it was the desire, of course, of appellant to have this apparent conflict removed. It thus made its application for the removal of the limitation on the assurance, justified, that the Secretary of War would remove it as a matter of course. No

other course in keeping with fair dealing could follow, after appellant had, in good faith, deepened and widened the channels of the Chicago River and its branches, at an expense of upwards of $10,000,000, to accomplish this purpose. And it must be well considered that it was unnecessary for appellant to do this work, except for the withdrawal of more than 4,167 seconds feet and up to 10,000 seconds feets. It had fruther constructed adjuncts and other works in reliance upon its right to take from Lake Michigan for sanitary purposes, the larger quantity.

Neither Section 9 nor Section 10 of the March 3, 1899 Act, under which the Secretary of War sought to act, authorizes that official to make findings or conclusions in refusing or granting a permit or authorizing work to be done. Neither is there any provision for findings and conclusions of the Chief of Engineers in refusing to recommend or in recommending as to those things by said sections provided.

Section 18 of the Act of March 3, 1899, with a reference to the altering of bridges, expressly provides for a hearing and findings to be made by the Secreary of War. *Inclusio unius, exclusio alterius.* If Congress had intended conclusions and findings to be made, it would have so stated with reference to the subjects for the Secretary of War to act upon, mentioned in Sections 9 and 10.

If it may be construed that the Secretary of War had authority to make findings and conclusions, they are subject to review.

In

Philadelphia Company v. *Stimson*, 223 U. S. 605,

suit was brought to set aside certain harbor lines, and to restrain the Secretary of War from causing criminal proceedings to be instituted against the company because of the reclamation and occupation of land outside the prescribed limits. This Court said (p. 620):

> "In case of an injury threatened by his illegal action, the officer cannot claim immunity from injunction proc-

ess. The principle has frequently been applied with respect to state officers seeking to enforce unconstitutional enactments.

* * *

And it is equally applicable to a federal officer acting in excess of his authority or under a power not validly conferred."

See also

Hardin v. *Jordan*, 140 U. S. 371.

Rosenberger v. *Harris*, 136 Fed. 1001, 1002.

United States v. *United Verde Copper Company*, 196 U. S. 207, 215.

School of Magnetic Healing v. *McAnnulty*, 187 U. S. 94.

In the latter case, the Court had under consideration the act of the Postmaster General in regard to the delivery of the mails, in which a decision by him was made. This Court said (p. 110):

"Yet such decision, being a legal error, does not bind the courts."

(b) In any event, Secretary of War Stimson's findings and conclusions were erroneous.

In speaking of Secretary of War Alger's permit of May 8, 1899, Secretary of War Stimson said:

"He permitted a flowage of 5,000 cubic feet per second." (Appellant's Narrative, p. 28.)

The fact is, as clearly shown, the capacity of the Sanitary and Ship Canal as built prior to the May 8, 1899 permit, and as fixed by law, was not less than 10,000 cubic seconds feet. Many officers of appellee had so found, and there is no dispute about this. However, the permit recited that the channels of the Chicago River and its branches had been widened and deepened so that 5,000 cubic second feet of water could be taken through them without creating a current greater than one and one-fourth miles per hour. This was merely a recital.

The granting clause of the permit authorized, as recommended by the Chief of Engineers, the opening and operation of the channel to its full capacity subject to only the two principal conditions mentioned, namely (1), Congressional action; (2), if a current in the Chicago River should be obstructive to navigation thereon, the Secretary of War might modify the amount of the discharge.

In

Corrigan Transit Company v. *Sanitary District*, 137 Fed. 851,

the Circuit Court of Appeals of the Seventh Circuit construed the effect of this very permit of May 8, 1899, and held that the preambles did not limit the granting clause, as the granting clause was unambiguous. In that case, it was claimed that the rate of flow of one and one-fourth miles per hour, was a condition or a limitation upon the amount of the withdrawal. The Court said (p. 855):

> "In the grant of permission no reference to rate is found. The only reference is in the second clause of the preamble to the grant. But a preamble cannot be resorted to except to help solve an ambiguity in the body of the grant or enactment. The grant here is unambiguous."

Again, the Secretary states, in his January 8, 1913 statement, that

> "the amount of the current permitted to be taken was modified or restricted until December 5, 1901, when it was fixed at the amount now permited, and these permits contained the condition—that the permission herein given shall be subject to such modification as in the opinion of the Secretary of War public interest may from time to time require."

The so-called permit of December 5, 1901, was an order of the Secretary of War to limit the flow under Condition 2 of the May 8, 1399 permit, with reference to an unreasonably obstructive current in the Chicago River. This December 5, 1901 order recites this Condition 2 and refers to other orders made under it. The words, "subject to such modification as

the public interest may from time to time require," cannot be construed to enlarge conditions of the May 8, 1899 permit.

The Secretary, by this January 8, 1913 statement, construed the March 2, 1827 Act as not authorizing the construction of the Sanitary and Ship Canal, or the diversion of water required for its operation. It stated that the Illinois and Michigan Canal,

> "derived its water for navigation purposes from the Calumet, Des Plaines and Chicago Rivers, and not from the Lakes",

and that the authorization and construction of the Illinois and Michigan Canal did not

> "offer the slightest congressional sanction for the great canal now under discussion which was not even contemplated until much more than a half century later." (Appellant's Narrative, p. 29.)

The holding of the Supreme Court of Illinois in *Mortell* v. *Clark*, 272 Ill. 201,

heretofore cited (this brief, p. 120) is absolutely contrary to the conclusion that the Sanitary and Ship Canal was not authorized under the congressional act mentioned.

The Act of January 9, 1836, of the Illinois General Assembly, under which the Illinois and Michigan Canal was constructed, provides for its being supplied with water from Lake Michigan, and for the reservation of ninety feet on each side for its enlargement. The width of the present Sanitary and Ship Canal is approximately the 180 feet thus reserved plus the then provided width of the Illinois and Michigan Canal, 45 feet, a total of 225 feet. This certainly gives some weight to the proposition that the parties intended (that is, Congress and Illinois) at that early day, in providing for this waterway, that at some time it should be of the size of the present Sanitary and Ship Canal, with the authority in Illinois to take such water from Lake Michigan as it considered necessary for the operation of such enlarged canal. The fallacy of the Secretary's statement is further heretofore demonstrated by us. (This Argument, p. 118.)

Secretary Stimson also found that Lakes Michigan and Huron's surfaces would be lowered by this diversion 6.9 inches. The evidence here of appellee places the lowering of Michigan and Huron at 5 inches. The Secretary also found correspondingly larger amounts for the effect of 10,000 seconds feet diversion upon Lake St. Clair, Lake Erie, Ontario and the St. Lawrence River and at Rapide Plat. He did not, however, make the statement that the possible lowering effect upon Lake Ontario was taken care of by the construction of the Gut Dam by the Canadian Government in 1903, as found by the Boad of Engineers on Waterway from Utica to the mouth of the Illinois River, appointed pursuant to the Act of Congress of June 25, 1910. (Appellant's Narrative, p. 176.)

The Secretary, in ascertaining the damage to commerce, followed the procedure of calculating a certain number of trips each season of the ore carrying vessels claimed to be affected and multiplied this by the amount per inch of claimed loss in cargo for each trip (100 tons per inch). He then multiplied the freight rate by the total claimed loss, and reached the result of many millions of dollars per year loss to commerce on the Great Lakes. The mere statement of the proposition shows its fallacy. This could not possibly be the loss, because there was only so much freight to carry by water on these boats so claimed to be affected. The loss necessarily could not be greater than the actual loss of carrying the volume of freight by these boats with the smaller tonnage.

The Secretary also concluded that it would be possible for appellant to get along with less than 10,000 seconds feet. In this, he absolutely overlooked the basic principle of the diversion for sanitary purposes—the reversal of the flow of the Chicago River at all times. 10,000 seconds feet is its minimum flowage. Without that continuous flow, the river would many times each year flow into Lake Michigan, carrying its pollution. There is no dispute upon this point.

The Secretary also concluded that objections of Canada to the 10,000 seconds feet diversion, was an obstacle in the way of the Secretary's acting upon the request of appellant. The treaty cannot be so construed.

The Secretary's construction of the force and effect of the case of

United States v. *Rio Grande Irrigation Company*, 174 U. S. 690,

was also error, as that case arose under a territorial act of New Mexico which is entirely different from the authority which appellant has under a reserve power of a *state*.

IX.

THE LOWER COURT SHOULD HAVE GRANTED THE MOTION OF JULY 12, 1920, BY APPELLANT, MADE FOLLOWING THE OPINION OF JUDGE LANDIS AND HIS DIRECTION AS TO THE DRAFTING OF A DECREE, THAT THE APPELLANT BE ONLY ENJOINED FROM TAKING IN EXCESS OF 10,000 CUBIC SECONDS FEET OF WATER FROM LAKE MICHIGAN ON CONDITION THAT APPELLANT PAY THE COST OF CONSTRUCTING SUCH COMPENSATING OR REGULATING WORKS AS THE UNITED STATES SHOULD PROVIDE TO BE BUILT TO OFF-SET FOR THE CLAIMED LOWERING OF THE LAKE SURFACES AND THEIR CONNECTING CHANNELS DUE TO 10,000 SECONDS FEET DIVERSION AT CHICAGO. ADMITTING, FOR THE SAKE OF ARGUMENT ONLY, ALL CONTENTIONS OF APPELLEE TO BE TRUE, APPELLANT CAN NOT BE ENJOINED FROM TAKING AN AMOUNT OF WATER MATERIALLY LESS THAN 10,000 CUBIC SECONDS FEET FROM LAKE MICHIGAN, UNTIL APPELLANT AND CITIES AND TOWNS WITHIN ITS LIMITS CAN, IF AT ALL, READJUST THEIR WORKS OF SEWAGE DISPOSAL AND OF PURIFICATION OF WATER SUPPLY TO SUIT THE CHANGED CONDITIONS.

(a) By granting the motion of appellant above mentioned, July 12, 1920, the lower court would have done equity. The construction of compensating or regulating works was entirely feasible, as the undisputed facts of the record show.

As grounds of the motion, it was alleged principally that the Board of Trustees of appellant had by ordinance on July 8, 1920, offered to pay the expense of constructing such regulating and compensating works as the United States might

determine to build to off-set for the claimed lowering of the surfaces of the Great Lakes and connecting channels, due to a diversion of 10,000 cubic seconds feet. The ordinance also authorized the attorneys for appellant to make such offer in this case. (Appellant's Narrative, p. 111.)

The motion alleged that the undisputed facts of the record, as has heretofore been pointed out in the statement (p. 77) and in Appellant's Narrative Statement showed that compensating or regulating works were feasible and would accomplish the end proposed. It will be recalled that the Board of Engineers on Waterway from Utica to the mouth of the Illinois River, recomended that contracting works be constructed in the St. Clair and Niagara Rivers, and found that Ontario did not require any such works to be constructed in the St. Lawrence, as the closure of the Gut Channel in the St. Lawrence had already off-set for any claimed lowering due to the 10,000 seconds feet diversion at Chicago. (Statement, p. 71.) It was alleged also that various witnesses and boards of engineers had likewise testified and found as to the feasibility of such compensating, contracting or regulating works, and that these facts were not disputed by appellee in this record. It was further pointed out in this motion that the Treaty of 1909 as to Canadian Boundary Waters, heretofore discussed (this brief, p. 78) contemplated that the United States might construct such contracting works. The estimate of the cost of these contracting works, according to the Board of Engineers on Waterway from Utica to the mouth of the Illinois River, as made in 1913, would not exceed $475,000 (Appellant's Narrative, p. 100) and they would entirely off-set for any claimed injury to commerce on the Great Lakes. (Appellant's Narrative, p. 101) And this amount, or any other that such works might cost, appellant offered to pay. (Appellant's Narrative, p. 111.)

Article 3 of the treaty is significant, as follows:

"ARTICLE 3.

It is agreed that, in addition to the uses, obstructions, and diversions heretofore permitted or hereafter pro-

vided for by special agreement between the Parties
2564 hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdiction and with the approval, as hereinafter provided, of a Joint Commission, to be known as the International Joint Commission.

The foregoing provisions are not intended to limit or interfere with the existing rights of the Government of the United States on the one side and the Government of the Dominion of Canada on the other, to undertake and carry on governmental works in boundary waters for the deepening of channels, the construction of breakwaters, the improvement of harbours, and other governmental works for the benefit of commerce and navigation, provided that such works are wholly on its own side of the line and do not materially affect the level or flow of the boundary waters on the other, nor are such provisions intended to interfere with the ordinary use of such waters for domestic and sanitary purposes."

(Appellant's Narrative, p. 532.)

It is apparent by this article that the contracting works of the character described were contemplated and in the minds of the high contracting parties; that is, that the United States might desire, in order to off-set for the claimed lowering of the levels of the lakes due to the Chicago diversion and other diversions, to build the contracting works recommended by the Board of Engineers on Waterway from Utica to the mouth of the Illinois River. Plans for works of this kind had been in contemplation for many years prior to the making of the Treaty. The Board of Engineers on Deep Waterways, in its report to the 56th Congress, 2nd Session, appointed pursuant to the Act of March 3, 1899, concerning the control of lake levels by building works of the character mentioned, recommended the construction of such works. (Rec. Vol. IV, p. 2387.) The International Waterways Commission likewise recommended the installation of such works. The Board of Engineers for Rivers and Harbors, in 1920,

reporting under the above mentioned resolution of June 30, 1917, with reference to all diversions from the Great Lakes, so recomended. (Appelant's Narrative, p. 102.)

The Court would have done complete equity between the parties, had it granted the motion and entered a decree accordingly. At comparatively small expense, the appellant could have been assured of the diversion from Lake Michigan of 10,000 seconds feet, absolutely required for the protection of the health of the people within its limits. On the other hand, the appellee would have, with the diversion to this amount existing, by the installation of these compensating or regulating works, had as good or better navigation facilities than would exist without the diversion.

It is fundamental, as stated in numerous cases, that it is within the power of a court of equity, in its discretion, to so enter a decree that neither party will be injured. The mere fact that this principle is sought to be applied to a novel situation, such as exists here, is no argument against its use. The fundamental principles of equity must be adjusted to every situation.

In

Myers v. *Block*, 120 U. S. 206, 214,

this Court said:

> "As to the power of a court of equity to impose any terms in its discretion, as a condition of granting or continuing an injunction, there can be no question."

In

Russell v. *Farley*, 105 U. S. 433, 438.

the question arose as to whether the Circuit Court had power to enter a decree on the subject of damages arising from an injunction where an injunction bond had been required. The Court discussed fully the powers of courts of equity to prescribe terms and conditions upon the parties at whose instance it proposed to act. The Court said:

> "The power to impose such conditions is founded upon and arises from the discretion which the court has in such cases, to grant or not to grant the injunction applied for."

Again it is stated, (p. 445)

> "The imposition of terms and conditions upon the parties before the court, is an incident to its jurisdiction over the case; and having possession of the principal case, it is fitting that it should have power to dispose of the incidents arising therein, and thus do complete justice and put an end to further litigation."

In

Marine Ins. Company v. *Hodgson*, 7 Cranch, 332,

the Court, by Chief Justice Marshall, said (337):

> "Being capable of imposing its own terms on the party to whom it grants relief, there may be cases in which its relief ought to be extended to a person who might have defended, but has omitted to defend himself at law."

See, also,

Veazie v. *Williams*, 8 Howard 134, 161.
Walden v. *Bodley*, 14 Peters 156, 164.

In

Newton v. *Consolidated Gas Co.*, 258 U. S. 165,

the District Court held an eighty-cent gas rate confiscatory, and entered a decree enjoining the enforcement of this rate, subject, however, to the condition that the company should not charge more than $1.20, and upheld the decree of the lower court in this respect. This Court said (177):

> "It was within the court's discretion to grant the injunction upon terms * * *."

In

Northern Pacific Railway Company v. *U. S.*, 104 Fed. 691, (C. C. A. 8th Circuit),

opposite the City of Grand Forks, NorthDakota, the railway company's tracks had been placed parallel with the bank of the Red River on the north and about 320 feet therefrom. The embankment of the railroad, by reason of its resting upon a sandy, clay stratum which extended to the river bed, caused a bar to be formed in the river, the railroad's embankment consequently settling. The railroad company was about to increase the height of the embankment to take care

of this settlement, when the United States brought suit in equity to enjoin it from so doing, under Section 10 of the Rivers and Harbors Act of September 19, 1890. A decree was entered accordingly. The Court of Appeals, however, found from the facts in the record that if the embankment were raised as proposed by the railroad company, ultimately this embankment would settle, so that it would extend through the clay, sandy stratum and rest upon a hard foundation, at which time there would be no further forming of the bar in the river; and it also found that, by dredging, the bar could be removed, and navigation would thus be unimpeded. The Court accordingly directed that the decree below be amended, as follows (p. 695):

> "The injunction hereby awarded shall not be so construed as to prevent the defendant company from proceeding with the work of raising its tracks between Cheyenne and Hill avenues to the proper level, if by dredging or otherwise, as the work progresses, it shall, at its own cost and expense, prevent the formation of any such bar in the channel of the Red River of the North as will at any time lessen or impair its navigability."

In many instances, the court of equity refuses relief to which the complainant may be, upon technical legal rights, entitled, where the granting of this relief would unjustly operate upon the defendant. In such case, if the payment of money damages will do justice to the complainant, the Court will impose that condition upon the defendant and deny the relief to the complainant.

In

Sanitary District of Chicago v. *Martin*, 227 Ill. 260,

the Sanitary District had acquired from Martin, in 1902, certain lands for right of way purposes. The deed contained a covenant that the Sanitary District should build a levee to protect certain other lands of Martin. This the District refused to do, on the ground that it did not have the right of way to build the levee and also because the cost of constructing the levee would be in the neighborhood of $60,000, whereas

the value of Martin's land and the damage to it was a very small amount compared with the cost of the levee. A bill for specific performance was filed. The Court refused Martin's relief and assessed the damages for the failure to build the levee. This was sustained by the Illinois Supreme Court. It said (268):

> "Appellant claims in its answer that the cost of the levee and ditch would be so much in excess of the benefit that it would be unjust and inequitable to require specific performance. The court accepted this view of the case, as it had a right to do, and sought to ascertain the damage in dollars and cents."

See, also,

Cushman v. *Bonfield*, 139 Ill. 219.
Phillips v. *Thomson*, 1 Johnson Chan. 133.
2 Sutherland on Damages, 590.
Story's Equity Jurisprudence, 798.

(b) Assuming that appellee is legally entitled at some time to an injunction, a decree, providing for the reduction of the diversion below 10,000 cubic seconds feet before appellant and the cities, villages and towns within its limits can readjust their works of sewage disposal or of purifying the water supply, is contrary to equitable principles.

After the motion of July 12, 1920, relating to the settlement of the decree in the lower court, and in support of the allegations of said motion, it was proved by evidence offered, about which there is no dispute, that appellant had on August 7, 1919 (Appellant's Narrative, p. 339), by ordinance laid out a program or project for the construction of artificial sewage purification works to take care of the human sewage and trade wastes not to be disposed of by the 10,000 cubic seconds feet diversion. These works were completely described and it was shown that the program of construction covered a period of approximately twenty-five years—namely to the year 1945. There was described in detail the location of the works and the method of construction. These works

so to be constructed in said period, were designed to dispose of and purify the sewage of the population of appellants, which exceeded in that period 3,000,000 people, and also the trade waste, which was equal to the sewage of a population of a million and a half or two million people. (Appellant's Narrative, p. 362.) The cost of all these works was estimated to be upwards of a hundred million dollars. It was shown that the total amount that the appellant could raise by taxation and the issuance of bonds in that period would barely take care of this construction cost. (Appellant's Narrative, p. 382.)

The cities, towns and villages within appellant's limits take or obtain water from Lake Michigan for domestic use and disseminate it by mains and other devices to the consumer. With this function of municipal government, appellant has nothing to do. The water supply of the people within appellant's limits, is not now filtered, and under no circumstances can sewage or an effluent from artificial sewage purification works be permitted to come in contact with the water supply unless that water supply is filtered before being delivered to the consumer. (Appellant's Narrative, p. 365.) The cost of filtering the water supply is the enormous sum of one hundred million dollars, and the annual cost of operating the filtration plants is three and a half million dollars. (Appellant's Narrative, pp. 366, 367.) The cities, villages and towns within appellant's limits were not made parties to this suit by appellee. No evidence as to whether the municipalities actually delivering domestic water to the consumer can build such works, is before the court. When, if ever, such works may be built by such municipalities, so that the water supply to the consumer will be filtered, is not shown. Even with all the sewage purified, as best it can be, by artificial means, and the entire water supply filtered, there would still be obviously not only danger of, but actual, pollution to the water supply. That does not exist today. It would be a change from a perfect system in operation today to a makeshift. To accomplish this end, it would be necessary for the

appellant first to complete its project of 1945, whereby the sewage and waste equivalent of the population exceeding three million people is purified at a cost of upwards 100 millions of dollars; second, after 1945, to install works to completely purify the sewage of a population equivalent of three million people now taken care of by the 10,000 cubic seconds feet diversion, at a cost of approximately an additional two hundred thirty-eight million dollars. (Statement, p. 79.) In addition, it would be necessary for the cities, villages and towns within appellant's limits furnishing the water to the consumer, to install water filtration plants and operate same, at installation cost, as stated, of one hundred million dollars and annual operating cost of three and a half million. When this gigantic task, a make-shift, could be accomplished, is beyond the power of human beings to determine. These cities and towns furnishing the water to the consumer during all these years have relied upon having the ideal water supply produced by the diversion of sewage and drainage therefrom. They have, of course, made no plans for any other pure water supply.

A Court, in applying principles of equity between private persons, will refuse to impose upon the defendant a decree which would cause even great financial loss, to take effect immediately, but will so make its decree, that the defendant may re-adjust itself and thus avoid unreasonable loss. Here we have a defendant before the Court representing the public, which has installed works to protect the health and a decree which would absolutely, as the undisputed evidence shows, destroy the effectiveness of those works and cause the raging of diseases due to an impure water supply, including nuisances in rivers and canals flowing through populous sections. And these diversion works of appellant have been in operation for almost a quarter of a century, performing efficiently their functions of providing a pure water supply for the people of Chicago and its environs, preserving lives and protecting health. It has been practically a third of a century since the construction work of appellant was commenced.

The work of appellant was projected and carried out, not in the night time, but openly, within full view of every one, observed by appellee's engineer officers, under the eye of Congress as reported to it by the Secretary of War in the Chief of Engineers Reports. Congressional acts sought to utilize appellant's works and diversion for navigation purposes. The operation of these works received international consideration by the International Waterways Commission, and were recognized as proper by the Treaty of 1909. In fact, every Board of Engineers or Commission that reported upon the subject of the use made by appellant of the water from Lake Michigan to operate these works, has sanctioned it. But, strange to relate, we have the Attorney General, by the suit instituted October 6, 1913, attempting to enforce, by an injunction immediately an order made by the Secretary of War December 5, 1901, because of current in the Chicago River due to the then restricted channels of it and its branches. That current was removed. The order ceased to have any force or effect. Appellee is proceeding upon an alleged paper right without substance or reason beneath it.

Under Section 18 of the Rivers and Harbors Act of March 3, 1899, the Secretary of War may, after hearing and findings, cause the alteration of a bridge. We apprehend that an order of the Secretary, with reference to such a bridge, must provide a certain reasonable time within which the obstruction to navigation may be eliminated, thus giving the railroad company an opportunity to re-adjust itself. An order providing an unreasonably short time, would be held invalid, and a court of equity would grant relief.

Pomeroy's Equity Jurisprudence, states (Vol. 5, Sec. 1948, p. 4429):

> "Whenever necessary to prevent a hardship, a reasonable amount of time in which the defendant may conform to the injunction, may be allowed."

In

United States v. *Luce*, 141 Fed. 385, 422,

(Circuit Court of Delaware. Opinion of Judge Bradford) a bill was filed by the United States to enjoin the defend-

ants from further prosecuting their business of manufacturing oil and fertilizer from fish, or alternatively, from so prosecuting their business there, as to allow offensive odors from their factory premises to reach the quarantine station of the United States, in Delaware Bay, near Lewes. The Court found the operation of the defendant's plant to be a nuisance. With reference to the entering of the decree, the Court said:

> "* * * the defendants should be accorded a fair opportunity of suppressing the nuisance caused or contributed to by them, if they can."

In

Peck v. *Newberg Light, Heat & Power Company,* (Supreme Court, App. Div., 2nd Dept.) 116 N. Y. Supp. 433,

(Opinion by Judge Jenks), the Court found that a nuisance created by the vibration of the engines could be prevented by changing the foundations, and concluded (p. 436) that

> "* * * the defendant should have an opportunity for such correction, * * *."

Sammons v. *City of Gloversville,* 67 N. E. 622; 175 N. Y. 346.

(The Court of Appeals of New York, Opinion by Judge Gray). Plaintiff instituted the suit to restain the City of Gloversville from continuing to empty the contents of its sewers and drains into Cuyadutta Creek. The judgment of the lower court

> "* * * suspended the operation of the injunction for the period of one year, with the privilege to apply to the court for other suspensions of the decree in order that the defendant might obtain 'appropriate legislation,' or change its system of sewage."

This judgment was unanimously affirmed by the Appellate Division and by the Court of Appeals.

Both Judge Landis and Judge Carpenter in this case recognized that time should be allowed for re-adjustment, but both apparently felt that the case was one to be ultimately presented to this Court or to Congress, and that proper re-

lief, in any event, and in this respect, would be granted. Judge Landis said:

> "I had hoped, as I stated at the beginning, that there might be a composition of this thing. The judge has no right to have personal feelings, but I live in this community, and it was my hope that there could be devised a program that would enable this district to have the benefit of this water, as much as it needs, that will give to the country this water in the solving of this problem of navigation (sanitation)."

The Judge directed a decree to be drawn, enjoining the defendant from abstracting more than 4,167 seconds feet of water from Lake Michigan, and said:

> 'The order will not go into effect, it will be suspended until thirty days after the Supreme Court meets in October. That is plenty of time, is it not? * * * Under no circumstances does this order go into effect now. Make that sixty days, and you may put in it, if it does not destroy the appealability of the order, you may put in a provision retaining me in control. The thing that the government wants, at least the court wants, being a citizen of Chicago, the thing I want is water without microbes. That is why I have held your law-suit." (Appellant's Narrative, p. 97.)

Judge Carpenter said, in his opinion (Appellant's Narrative, p. 115.)

> "This matter is a subject which needs the consideration of thinking people, not only in the State of Illinois, but in the whole United States. The Treaty with Canada entered into some years ago seemed to contemplate an acquiescence on the part of the Canadian Government to the withdrawal of 10,000 cubic feet a second by the Drainage District. However, that may be, the Secretary of War has not given his official consent. Whether the increased withdrawal should or should not be made is properly a political and not a legal question, in the absence of consent by the Secretary of War. The Legislature of the State of Illinois, the various civic bodies, the Association of Commerce, and senators and representatives should see to it that at the earliest possible moment the situation here is brought to the attention of Congress, so that by appropriate legislation the health and welfare of this great community may be safeguarded.

I have no doubt that when the matter is properly presented it will be taken up by Congress and by the State Department, and some plan devised which will bring about adequate and the desired results.

It goes without saying that this Court will not issue an injunction to be effective forthwith.

* * *

On the testimony of the Government engineers the Court might in the exercise of a sound discretion, delay the effectiveness of its injunction for from fifteen to twenty-five years to enable the Sanitary District or the State of Illinois to arrange for other means of disposal of the sewerage now handled by the Sanitary District.

Believing as I do that it is a matter for the immediate action of Congress, a decree may be prepared finding the facts as stated in the Bill and enjoining the defendant from withdrawing from Lake Michigan in excess of 4,167 cubic feet a second; the decree, however, not to go into effect for six months.

The matter must necessarily go to the Supreme Court of the United States for final settlement, and no doubt, if need be, when the record is there filed, application may be made to that Court for a supersedeas or further stay."

Afterwards, Judge Carpenter (June 29, 1923), in granting the appeal to this Court, suspended the injunction during its pendency.

(c) The decree of injunction in the court below absolutely enjoined appellant from withdrawing from Lake Michigan in excess of 4,167 seconds feet without any condition. The Secretary of War would be powerless, under this decree, to permit or authorize any further diversion. This condition should have been observed.

On appellee's theory the Secretary of War has the authority to authorize the diversion, otherwise he would have no right to limit. The injunction suit is based upon the limitation made by the Secretary of War December 5, 1901. Obviously, the decree should have provided that it should be subject to any further action that the Secretary of War

might take in authorizing or consenting to a diversion in excess of the limitation of December 5, 1901 (4,167 cubic seconds feet).

Furthermore, as it appeared from the record, many things had transpired since the limitation of December 5, 1901. Over ten years had elapsed between the refusal of the Secretary of War on January 8, 1913, to remove the limitation and the date of the entry of the decree, June 18, 1823.

This was a suit instituted by the Attorney General under Section 12 of the Rivers and Harbors Act of March 3, 1899. In view of the lapse of time, the lower court should have directed that the matter be presented again to the Secretary of War before a decree was entered at such late date enforcing an order of the Secretary of War made twenty-two years prior thereto.

This is particularly true in view of the many things that had transpired—among others, negotiations between the War Department and appellant, as represented by appellant's ordinance of August 7, 1919, (Appellant's Narrative, p. 339), and as shown by the letter of the Division Engineer at Chicago to the Chief of Engineers of May 24, 1921. (Appellant's Narrative, p. 344.)

The Transportation Act of 1920 (41 Statutes at Large, 456), Section 500 thereof, particularly, directs the Secretary of War to develop water transportation by inland waterways, co-operate with municipal governments and "to investigate any other matter that may tend to promote and encourage inland water transportation." (41 Statutes at Large, 499.) The existence of this act is a further reason why this whole matter should have been further considered by the Secretary of War, before the limitation made twenty-two years ago as to the withdrawal from Lake Michigan, should be enforced. Under the Transportation Act mentioned, the Secretary's duties were much broader than under any previous legislation. In investigating the matter of diversion, it would be necessary for him to take into consideration the

question of the use of appellant's diversion for navigation and to have given force and effect to the various reports made pursuant to acts of Congress that any damage to the Great Lakes by the diversion, could be entirely compensated for by building contracting or regulating works. Compensation or regulating works would thus take care of any damage to commerce on the Great Lakes by reason of the diversion, and the diversion would at the same time make available a deep waterway from Chicago direct to the Gulf of Mexico through the Sanitary and Ship Canal, the Desplaines, Illinois and Mississippi Rivers. This broad question might well be considered by him under said Transportation Act.

(d) This matter should be settled by Congress.

In February, 1924, appellee asked that this case be set for an early hearing. Appellant objected, on the ground that bills had been and were pending in Congress looking to direct authorization of this diversion. Since that time hearings have been had on a number of bills pending before the House of Representatives by the Rivers and Harbors Committee. The hearings on these bills were not concluded, when the last session of this Congress ended, and the Committee adjourned to take up the matter at the next session of this Congress. The said bills are still pending, undisposed of by said committee on River and Harbors of the House, no action has been taken thereon, and they have not yet been reported. We believe that this matter, in any event, is one which should be disposed of by co-operative study.

New York v. *New Jersey and Passaic Valley Sewage Commissioners*, 256 U. S. 296, 313:

"We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal presented by the large and growing populations living on the shores of New York Bay is one more likely to be wisely solved by co-operative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court, however constituted."

In

Virginia v. *West Virginia*, 246 U. S. 565,

this Court, while giving an opinion upon certain of the points involved, reserved further action to enable the parties to reach an adjustment of their differences impelled by consideration of "the character of the parties."

Hon. John W. Davis, in an address before the New York State Bar Association, January 20, 1922, in discussing the above case, *Virginia* v. *West Virginia*, said (Amer. Bar Assn. Journal, February, 1922, Vol. VIII, pp. 77-82):

> "* * * after suggesting the possibility of Congress coming to the aid of the Court and hinting at the power of the Court itself to decide the amount and method of taxation to be put into effect, the Court with a call for further argument postponed its decision and threw itself back once more upon the sense of duty and the suggestions of self-interest of the contending parties. It is gratifying to reflect that this last appeal was not made in vain, and that an amicable adjustment by the States themselves proved one more the moral power of the Court, and vindicated its confident reliance upon 'a decent respect to the opinions of mankind' as the ultimate sanction of its judgments."

The Secretary of War in the May 8, 1899 permit for the opening of the Sanitary and Ship Canal, and in almost every permit issued in connection with this matter, stated:

> "1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress."

CONCLUSION.

The history of the establishment of the Chicago diversion to the capacity of appellant's works as fixed by the Illinois Statutes and the connection of appellee with it, discloses a well settled policy of appellee to co-operate with the State of Illinois, extending over a period of almost a century. The people of Chicago and environs, relying upon this policy, expended millions to also utilize the resultant waterway for the protection of their water supply; and they have so used it for upwards of sixty years. Until the refusal of Secretary Stimson to specifically authorize the diversion to the amount of 10,000 seconds feet and the further act of the Attorney General in filing the bill for injunction on October 6, 1913, there was no digression. This former policy of co-operation by the Government is in every respect in keeping with appellant's position here. Appellee by such action not only recognized the specific authority for the diversion, under the Act of Congress of March 2, 1827, for the construction of the Illinois and Michigan Canal, but also the authority of Illinois under its police power as expressed by the Act of May 29, 1889, under which the Sanitary District was organized. Not only acts of engineer officers and the Secretary of War, but also acts of Congress, are evidence of appellee's recognition of appellant's right in the premises.

Appellant's Sanitary & Ship Canal was under construction for years, to be used in diverting from Lake Michigan a definite quantity of water. To use the canal as it was constructed, it was necessary to effectively connect its northern terminus with Lake Michigan. The capacity of the channels of the Chicago River and its branches was originally not sufficient. Excavating to widen and deepen these channels was necessary. The preliminary work of excavation to provide for the initial operation of the channel was authorized.

To open the Sanitary and Ship Canal after it was completed, it was necessary to do certain work. This was authorized by the principal permit of May 8, 1899, without limitation as to amount of flow, except as to a current in the Chicago River becoming unreasonably obstructive to navigation. It was understood that further work of excavating in the Chicago River and its branches was necessary to provide for the water for the increase in population. In due course this further work of excavating in the channels of these rivers to make them large enough for the maximum diversion was authorized. The work was done, performed and carried out in accordance with the plans for such work, as authorized by the Secretary of War.

The work of excavating the channels of the Chicago River and its branches ~~having not~~ has been performed as authorized. If further excavation were necessary to enlarge them so that a current would not be obstructive to navigation thereon, then a decree should have been entered allowing appellant its full diversion, but containing a condition that appellant further improve those channels.

The Secretary of War recognized that the problem, making necessary appellant's diversion works, was one of great public importance, which might be submitted to Congress. The Secretary reported everything to Congress. Congress not only did not act in any manner indicating an intention to limit the operation of the works, but, on the contrary, acted in such manner as to show its purpose to utilize the works and the attendant diversion for navigation. It also evinced the intention to build works in connecting channels of the Great Lakes to offset for any diversion. So the facts show appellant was acting with the co-operation of the Federal Government in the solution of this problem. It had the right to believe that its exercise of the police power of the state in this reasonable manner was lawful.

Appellant is not attempting to divert from Lake Michigan an unlimited amount of water. Its purpose now, and the rec-

ord discloses no other, is to withdraw only a reasonable amount for the protection of the water supply, for navigation and to prevent nuisances. That amount was deliberately fixed a third of a century ago when its Sanitary and Ship Canal was laid out. It then appropriated the quantity of water necessary, as fixed. No one questioned its right.

Appellant's offer (July 12, 1920,) to defray the expense of building works in the Great Lakes outlets to offset for any claimed injury to commerce on the Great Lakes was more than equity required. It should have been accepted by the court. A decree should have been entered allowing appellant to divert the 10,000 cubic seconds feet of water from Lake Michigan on condition that it comply with its offer. Appellee would thereby have been protected in the only interest it has in this suit —navigation upon the Great Lakes system. That was the least the court could have done for appellant.

Appellant is now confronted with a decree which will compel appellant to change its plan for a deep waterway and its whole policy of protecting public health, the works to accomplish which were determined upon after deliberate and careful investigation, to throw aside the works thus constructed at a cost of many millions of dollars, and to enter upon another and different method of protecting the water supply, the execution of which will cost a gigantic sum, which method in effectiveness will be, at best, a mere shadow of that already in use.

The decree of the District Court should be reversed.

Respectfully submitted,

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No. 161

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

THE UNITED STATES OF AMERICA,
Appellee.

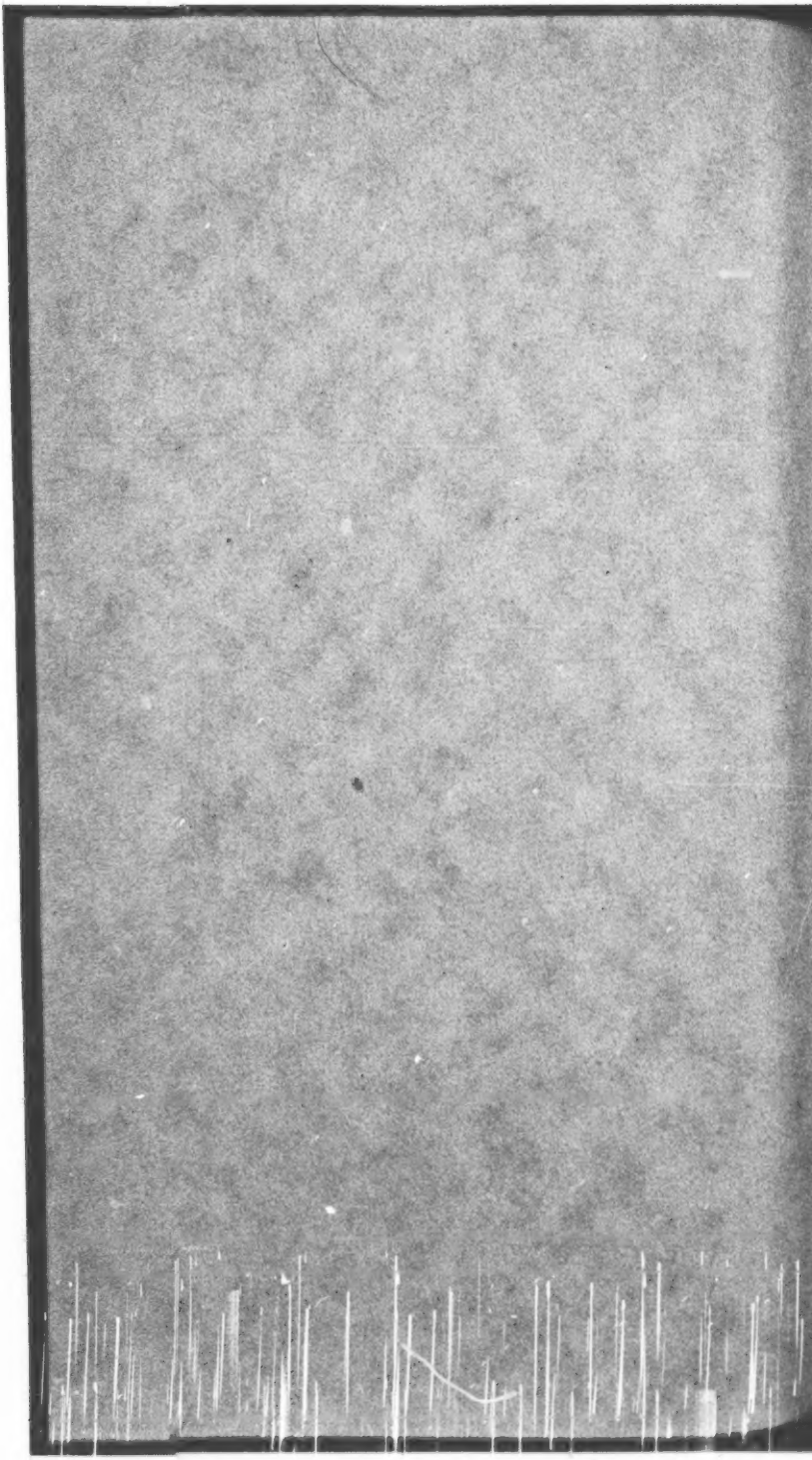
Appeal from the District Court of the United States, for the Northern District of Illinois, Eastern Division.

REPLY BRIEF AND ARGUMENT FOR APPELLANT

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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO, *Appellant*, vs. THE UNITED STATES OF AMERICA, *Appellee*.	Appeal from the District Court of the United States for the Northern District of Illinois Eastern Division.

REPLY BRIEF AND ARGUMENT FOR APPELLANT.

MAY IT PLEASE THE COURT:

Appellee's brief is voluminous. There are many inaccurate statements of fact, the incorrectness of which in every instance we will show by quotations from or reference to the record. Several hundred authorities are cited. The limited time at our disposal does not permit an analyzation of each case. We are compelled to confine ourselves to a consideration in this brief of only the cases from which quotations have been made by appellee, or upon which it particularly relies. The seemingly harsh criticisms of our statements of fact and points and arguments, appearing at so many places in appellee's long brief, will not be answered by us in kind. We will, however, take up *seriatim* the various incorrect statements of fact and points and arguments contained in appellee's brief.

The briefs filed by *amici curiae* in support of appellee's position, being States of Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin and Lake Carriers' Association, as *amici curiae,* are discussed in the briefs filed supporting appellant's position, by *amici curiae,* being States of Illinois, Missouri, Tennessee, Louisiana, Chamber of Commerce of St. Louis, Memphis Chamber of Commerce, New Orleans Board of Trade, New Orleans Association of Commerce, the Mississippi Valley Association, the Chicago Association of Commerce.

APPELLEE'S ARGUMENT ON THE FACTS.

(Its Brief, p. 1.)

Appellee's so-called argument on the facts should properly be disregarded in the consideration of the issues here, as it is largely repetition. Most of the facts stated by appellee are restated in its argument on the law in the places where appellee's counsel have attempted to apply authorities to the facts. Many facts appearing in our statement are merely restated by appellee. In that portion of this reply Brief where we discuss appellee's points and authorities, we have, in *extenso,* by reference to or quotations from the record or appellant's narrative, demonstrated the incorrectness of various statements of fact which do not agree with those stated by us in our original brief. Therefore, in discussing appellee's Argument on the facts, we will only refer to some of the most glaring inaccuracies.

To avoid repetition, we will carry in the margin of the discussion of appellee's argument on the facts, a reference to the page of its argument where may be found the matter considered by us to be incorrect. We may also refer by page to portions of our reply brief where, in discussing appellee's legal points, we have shown the inaccuracy of appellee's statements of fact.

Page of Appellee's Brief.

2 The appellant does not propose to divert 20,000 cubic feet per minute for each one hundred thousand of the population in 1960. The Sanitary and Ship Canal was only authorized to be built for a capacity of approximately 10,000 cubic feet per second. The capacity in the rock section is 14,000 cubic seconds feet. (Cooley, Appellant's Narrative, p. 295.)

There is no evidence in the record that the City of Chicago has profited by cheap water supply in comparison with other cities on the Great Lakes. The record does not disclose whether the water supply of such other cities is cheap or expensive. It does disclose, however, that the water supply of the people of Chicago as produced by appellant's works, is much better than the other cities, the death rate from typhoid fever for Chicago being very much below that of other cities. (Appellant's Narrative, p. 203.)

5 The record does not disclose any motion made by appellee to strike portions of appellant's answer in the Main Channel suit. No order was ever entered concerning any such motion. There was only a notice given by appellee that it would make such a motion on February 28, 1914. (Rec., Vol. III, p. 126.)

What Judge Landis said he might do, is unimportant. It was a mere oral opinion. It was not signed by him. Judge Carpenter entered the final orders and decrees. He rendered an opinion. (Appellant's Narrative, 113.) There is no mention in his opinion of any motion to strike or that he would enter any order concerning it, or as to any agreement or understanding such as counsel refers to, concerning their presenting evidence in opposition to that offered by appellant in support of the portions of its answer of which appellee complains.

Furthermore, appellee filed exceptions on June 25, 1908, among others, to the three principal affirmative defenses set forth in appellant's answer to the complaint in the Calumet River suit. The exceptions were overruled on June 26, 1908. (Appellee's Brief, p. 11.) The three principal affirmative defenses set up in this answer were the same affirmative defenses alleged in the answer in the Main Channel suit. The exceptions filed to the answer in the Calumet River suit raised the issue as to rele-

vancy and materiality that it is claimed was raised by appellee's alleged motion to strike certain portions of appellant's answer to the Main Channel suit. Thus it was apparent that the motion to strike portions of appellant's answer in the Main Channel suit, was in effect passed upon when the court overruled the exceptions to the answer in the Calumet River suit. Appellee cannot here claim that it did not have an opportunity to meet various affirmative defenses of appellant, as they were direct issues in the case. They were kept in the case by order of the court. The case was tried on the issues raised by the bills and answers as filed.

18 Appellee's counsel suggest that the delay in the final disposition of this case in the District Court, was due to appellant. The record does not disclose any such facts. They refer to Vol. VI pp. 3878-80, which is merely a memorandum for the Secretary of War by the Chief of Engineers, dated December 18, 1911, not quite three years after the first suit was instituted, and approximately three years before the second suit, the Main Channel suit, was commenced. Furthermore, some suggestion has been made that all of appellee's evidence was submitted, and appellant delayed putting in its evidence. The record discloses that the evidence of appellee as to current in the Chicago River was not presented until April, 1914. (Rec., Vol. V, pp. 1320-30, witnesses Emerson, Minskey, Green, Hamilton and Simmons.)

This was after appellant had submitted all its evidence in chief, and when appellee was presenting its rebuttal.

Counsel say: "Judge Landis in effect found." There was no decree entered by Judge Landis. There was no memorandum signed by him; there was a mere oral opinion in the nature of a direction for preparation of a decree. And he never reached a position where he performed or was about to perform, any formal act of en-

tering an order or even signing a memorandum stating his conclusions.

23 We take issue with counsel's construction of Section 23 of appellant's Organic Act. This section expressly provided that the canal should be of capacity of not less than 300,000 cubic feet of water per minute, to be of a depth of not less than 14 feet, with current not exceeding three miles per hour, "*and if any portion of such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan, of not less than* 18 *feet, such portion of said channel shall have double the flowing capacity above provided for.*" (Appellant's Narrative, p. 73.) The channel was so constructed across the rocky stratum, as it was intended it should be at the time the Act of May 29, 1889, was passed.

26 The date of the commencement of work is prior to September 19, 1890, as set forth elsewhere. (*Infra*, p. 27.)

27 The subject matter of Major Marshall's letter of August 24, 1892, was the item in the Rivers and Harbors bill of July 13, 1892, asking that the engineer at Chicago submit a report as to improvement in the Chicago River, and related to cooperation by the Federal Government with appellant in appellant's plans for deepening and widening the Chicago River and its branches, to make it the supply channel by which the waters of Lake Michigan could be carried to the Sanitary and Ship Canal, as stated in the resolution of appellant's board of trustees of April 21, 1891. (Appellant's Narrative, p. 454.) The cooperation mentioned was given appellant by Congress in many acts following the one under which Capt. Marshall was to make his report, mentioned in said letter of August 24, 1892, which are set forth elsewhere herein. (*Infra*, pp. 104 to 110.)

The president of appellant's board, in replying to said letter of Capt. Marshall, August 25, 1892, said (Rec., Vol. IV, p. 2377):

> "I am personally very glad to note in your communication your good will towards the enterprise in which we are engaged, and I trust that the good feeling which exists will tend towards a proper solution of the question of a waterway from the Lakes to the Mississippi."

The letter of Capt. Marshall, May 23, 1893, part of which is quoted by appellee, also stated (Rec., Vol. IV, p. 2378):

> "I have to say for the information of your Honorable Body, that however I may differ from the local authorities as to the methods adopted by them for the amelioration or care of their defective sewerage, and water supply, that *I recognize their right and the authority and capacity of the commonwealth of Illinois and the municipality of Chicago to deal with their local matters in their own way*, and that having declared their choice, *United States officers shall place full faith and credence in their acts*. This office then, as far as not called by law to express opinions, etc., shall work in accord with local laws to further rather than obstruct, their ends and objects, as expressed clearly by the laws of the locality.
>
> • • •
>
> I have to say that I desire the backing and cooperation of the Trustees of the Sanitary District of Chicago to prevent any encroachments whatever upon the present channel of Chicago River, and to express to the Trustees of the Sanitary District my disinclination to recommend to the Secretary of War any restriction by bridges, filling or otherwise upon the capacity of the Chicago River, except where imperatively demanded by the people of Chicago in crossing the river by bridges.
>
> An examination of the locality in question will be made at the earliest practicable date, and if it be found that it comes within the purview of the in-

structions issued to the United States District Attorney to stop by injunction from an United States Court such encroachment this action will undoubtedly be taken on my application, by the District Attorney."

It will be observed from the above quotations that the engineer officer at Chicago recognized the full authority of appellant to proceed in the manner it was doing, and that it construed appellant's program as lawful and properly sanctioned. (Point I-D of our original brief, p. 128.)

Furthermore, it is apparent Capt. Marshall recognized that appellant would have to enlarge the channels of these rivers and he proposed to prevent encroachments, which would be in the way of appellant's work there.

28 Capt. Marshall's report of August 9, 1893, is analyzed herein. (*Infra*, p. 105.)

The letter of Col. Poe of March 22, 1895, asked for information from appellant. Apparently Col. Poe and his Board received all they desired, for in the second paragraph of the Board's report, it is stated (Appellant's Narrative, p. 465):

"The Board met in Chicago August 12, 1895, and on the 13th and 14th accompanied the officers of the Drainage Canal over the line under construction. Every facility and courtesy possible has been extended by the trustees and engineers of the canal for a full investigation of the subject matter."

Counsel quote certain portions of the report of the Board of Engineers, of which General Poe was chairman, dated August 16, 1895, and state that by that report the United States "*asserted its paramount control with respect to the creation of obstructions to navigable waters.*" This is entirely refuted by the following sentence in said report (Appellant's Narrative, p. 470):

"With this an established fact it is impossible to think that U. S. supervision shall not be extended to the Chicago Drainage Canal in due time."

There was not only no question of authority, but an express statement by this board of engineers of which the United States engineer at Chicago was a member (Major Marshall) but on the contrary an express statement that Congress had not then exercised control over the use and diversions of United States navigable waters for domestic and sanitary purposes. The report is in keeping with the attitude of the same United States engineer at Chicago, as shown by his other reports on this subject, and with our contentions.

31 The United States officers observed appellant's work, made careful study and investigation of its purpose and the effect of the operation of the works, and reported the same to Congress. The United States itself did not assert any control. Congress never acted at any time in opposition to appellant and is not acting.

35 The argument as to the effect of Section 10 of the Act of March 3, 1899, has no place in the Argument on the facts, and has been fully considered by us in our original brief, (Points I and II, pp. 111-140) and also herein (Infra, p. 50.)

37 The only possible condition of the full diversion under the permits mentioned and according to the conditions thereof to be taken up, was the question of current in the Chicago River. The only thing that appellee's officers were concerned about, and considered they had authority to determine, was the question of the reversal of the Chicago River and current therein.

41 The contentions of appellee as to the effect of the July 11, 1900 permits are elsewhere discussed herein. (*Infra*, p. 89.)

48 The statement of the Secretary of War of January 8, 1913, refusing to remove the limitation of the order of December 5, 1901, and to specifically grant authority for

10,000 seconds feet diversion, is discussed under Point VIII of our original brief, (p. 205).

51 The Wilmette permit, September 11, 1907, is referred to us herein. (*Infra*, p. 64.)

53 The effect of counsel's position as to the Calumet permit, June 30, 1910, is discussed by us elsewhere herein. *Infra*, p. 65.)

against appellant or its officers under Section 12 of said

57 There was no admission by appellant of the correctness of the allegations as to the lowering of the levels of the Lakes in the hearing before Secretary of War Stimson, except for the purpose of that argument. (*Infra*, p. 58.)

58 As to the so-called decision of Secretary of War Stimson of January 8, 1913, see our original brief. (Point VIII, p. 205.)

64 What purpose counsel have in referring to the letters of February 24, 1913, and March 15, 1913, from the Engineer Department of the United States, in which they threaten state officers performing their duties under mandatory provisions of state law in the interest of public health, with penal action, is impossible for us to even guess. It is not likely that any United States attorney at Chicago would have considered seriously a suggestion by the War Department that criminal action be taken Act of March 3, 1899. It would seem only proper that appellee's counsel should quote the portions of the letters of Mr. Adcock to the War Department referred to

66 which show the true import of said letter. The correctness of the statement in that letter to the effect that the International Waterways Commission by its report of January 4, 1907, had recommended a diversion of 10,000 cubic seconds feet of water at Chicago, is considered elsewhere herein. (*Infra*, p. 82.) Just before ap-

pellee's last quotation from said letter of March 22, 1913, the following appears (Rec., Vol. VI, p. 3972):

> " 'Until the decision of the Honorable Secretary of War of January 8, 1913, it was the general belief that the Secretary of War would without question formally consent under present existing conditions to the taking of water up to at least 10,000 cubic feet per second from Lake Michigan through the channels of the Sanitary District.
>
> The Act under which the Sanitary District is organized and under which it is now operating makes it mandatory upon the Trustees of the Sanitary District to cause not less than 20,000 cubic feet of water per minute for each 100,000 of the population of the District to flow from Lake Michigan through its channels. The population of the District is such that to comply with its organic law, it is necessary that the Board of Trustees cause more than 4,167 cubic feet of water per second to flow through the channels of the Sanitary District. That condition has existed for a number of years past and the Sanitary District has been flowing through its channels sufficient water to dilute the sewage pursuant to its Organic Act (20,000 cubic feet per minute for each 100,000 of population). The Sanitary District cannot either under the law of its creation or if it intends to preserve the health of the inhabitants of the District reduce that flow.
>
> I have at some length pointed out to you the facts with most of which no doubt you are familiar so that the situation in which the Sanitary District is now placed may be fully considered by you.' "

It concludes as follows (Rec. Vol. VI, p. 3973):

> " 'I respectfully request that before any definite conclusion is reached by the Government with reference to these suggestions that a conference be arranged between the representatives of the Sanitary District and the Government at such time and place as may be convenient to the Government representatives.' "

So it is apparent that the letter is merely a suggestion for future conference. Furthermore, it set forth the

utter futility and childishness of the War Department suggestion for any penal proceedings.

67 Appellee has failed to give consideration to the ordinance of the Board of Trustees of appellant of August 7, 1919, under which a project was laid out for the construction of artificial sewage purification works by appellant during the period ending with 1945, whereby the sewage and waste of the population over 3,000,000 would be taken care of without additional diversion from Lake Michigan. This program was explained in detail by the witness Langdon Pearse, to which there is no evidence to the contrary. (Appellant's Narrative 345-361.) This ordinance of August 7, 1919, was passed by appellant's board of trustees in cooperation with the United States Engineer officer at Chicago, Col. William V. Judson, as is shown by his letter of May 24, 1921, to the Chief of Engineers, U. S. A. (Appellant's Narrative 344.) After describing the project for artificial sewage disposal laid out by appellant under the ordinance of August 7, 1919, Colonel Judson in his letter concludes (Appellant's Narrative 354):

> "'20. In the meantime the Sanitary Trustees are proceeding energetically with their plans for sewage treatment and disposal as outlined in enclosed memorandum. Since the date of their report, they have acquired 180 acres of land located on the North Shore Channel as a site for their proposed North Side purification plant.
>
> 21. The progress made by the Sanitary District is well illustrated by Exhibits E and F constituting part of enclosure showing their budget appropriation for 1921 and their expenditures during the ten year period 1910-1920. During the last named period the expenditure for sewage treatment works has amounted to approximately $9,400,000. Their budget for 1921 provides $6,500,800 for the completion of old projects and $3,242,500 for new projects.
>
> 22. The program of the Sanitary District, if carried out, will insure the practicability of keeping the

volume of water diverted from Lake Michigan within limits which it is hoped all concerned will finally deem reasonable.' "

The above quotation from Col. Judson's letter of May 24, 1921, to the Chief of Engineers, must be read, of course, in connection with his letter to the Chief of Engineers dated March 23, 1921 (H. R. Doc. No. 2, 67th Congress, 1st Session), wherein he speaks of the amount of diversion required for a deep waterway from the lakes to the Gulf, and concludes as follows (*Infra*, p. 75.):

> "Then should Congress place the limit of the amount of water to be withdrawn from lake Michigan at 10,000 seconds feet, which I deem probable and under proper conditions advisable, that increment would of itself increase the depth to 9 feet."

So, when Col. Judson in the last paragraph of the quotation from his May 24, 1921, letter stated that the program of appellant would keep the flow *"within limits which it is hoped all concerned will finally deem reasonable,"* he had in mind the 10,000 cubic seconds feet of water mentioned in his letter of March 23, 1921, when he spoke of the limit of the water to be withdrawn as 10,000 seconds feet *"probable and under proper conditions advisable."*

69 The table shows the yearly average withdrawal from 1900 to 1913 inclusive. It was not until the end of the period shown (1913) that the appellant's diversion works were entirely completed. It was a physical impossibility until the channels of the Chicago River were substantially deepened and widened, as authorized under the permits of the Secretary of War of July 11, 1900, to withdraw through these channels the full 10,000 cubic seconds feet. All this was shown by Mr. Randolph. (*Infra*, p. 43.) Furthermore, the necessity for the full 10,000 seconds feet diversion in order to keep the Chicago River at all

times flowing away from Lake Michigan, became more marked as the sewered and paved area of Chicago and its environs increased, because of which the floods would be more quickly delivered to the river.

78-114 Appellee has devoted many pages to a discussion of the evidence concerning the Great Lakes and claimed damage to commerce; that is, the theoretical effect of appellant's diversion at Chicago upon the levels of the Great Lakes and their connecting channels, including the theoretical damage to commerce. We believe that in our original brief (Statement of the case, pp. 63 to 69) this evidence is fully set forth and in such manner that it can be understood. Only one conclusion can be drawn from a perusal of appellant's discussion of the hydraulic evidence and the evidence relating to commerce; and that conclusion is that the whole basis of appellee's case is theory of experts. The results depend upon an inference of the unseen. No lay witness has testified as to the actual lowering of the levels of the lakes or their connecting channels, or that damage to commerce has been observed, notwithstanding the diversion has existed for almost a quarter of a century.

We will, however, briefly refer to certain pertinent facts appearing in the record relating to the character of appellee's conclusions as to the Chicago diversion's effect upon the levels of the lakes. Obviously the ascertainment of the correct increment of the different outlet rivers, was important. We have pointed out the ingenious process by which appellant's experts sought to obtain an increment. (Appellant's Statement, Original Brief, p. 64.) In the first place, a great number of discharge measurements were required to be made and tied or related to the level of the controlling lake which produced or was responsible for the amount of discharge at the time the measurement was made. The measurement

of the discharge was a complicated matter, and required the exact determination of the cross sections of these great rivers at the place called the discharge measurement section. It required, also, the correct establishment of the rate of flow at a given instant. A current meter was used, called the Haskell meter. There were two kinds of meters, and there were numbers of methods for determining rate of current. Various witnesses differed as to what instrument should be used. However, the discharge measurements were made by the United States Lake Survey and they used a Haskell current meter. Some of the sources of error occurring appear in the record.

The correctness of such measurements of discharge depend first upon the *rating of the meter,* that is, the relation of the revolutions of the meter wheel in a given time to the velocity of the water passing it. Due to changes in lubrication resulting from the displacement of the oil by water, the revolutions for a given velocity decrease as the time of immersion increases. (Haskell, Vol. V, pp. 2737, 2738; Shenehon, Vol. V, pp. 3374, 3380.) Variations of as much as 2 per cent in a day have been noticed. (Shenehon, Vol. I, pp. 352, 366.) In rating meters by the methods used by the lake survey in the field it is not possible to subject them to as rigorous conditions as those they encounter in actual gaging, on account of the limits of human endurance. (Williams, Vol. II, p. 908.) It follows then that when a meter has been used in a gaging for two hours the lubricant has been materially more reduced than by two hours of rating, where during a considerable portion of the time the meter wheel would not be rotating, while in the stream it is in motion continuously. The erroneous indication resulting from applying the average results of a rating to obtain the average results of a gaging are

in one direction and produce an indication of velocity less than the true one. (Williams, Vol. II, pp. 913, 963.)

The effect of *turbulence* and *pulsations* upon meter indications has been presented by Williams, Schoder and Turner, and by experiment was found to reduce the meter indication practically 10 per cent. (Williams, Vol. II, pp. 734, 958; Schoder, Vol. III, p. 1549; Turner, Vol. III, p. 1575.) Pulsations are present at all the gaging stations to some extent and decided turbulence is encountered especially at the bridge and open sections of the Niagara. (Freeman, Vol. III, pp. 1165, 1186; Williams, Vol. II, p. 733.)

The next source of inaccuracy in a meter measurement of flow is in the determination of the *area of the cross section.* For this work the Engineers of the Lake Survey have developed processes of considerable refinement, involving corrections of observed depths from a theoretically computed table designed to provide for the drift of the sounding weight due to the current. (Moore, Vol. I, p. 255; Moore, Vol. V, p. 2908.) No experimental evidence of the accuracy of these corrections has been submitted in this case and the question still remains unsettled as to whether the corrections applied may have been too little or too great.

Necessarily it is not possible to sound every point of the bottom and soundings were taken at intervals usually of from 10 to 20 feet. (Moore, Vol. V, pp. 2897, 2902; Shenehon, Vol. I, p. 299.) What the elevation of the bottom may have been between soundings is unknown, but is assumed to be uniformly varying from one to the other. The area of the cross-section changes as the lake rises and falls and sometimes the surface rises more at one end of the section than at the other. (Rec., Vol. I, p. 191.) The witnesses for appellee have claimed an

accuracy of from 1 to ½ of 1 per cent for the determination of area. (Shenehon, Vol. I, p. 311; Moore, Vol. V, p. 2870; Richmond, Vol. V, p. 2942; Ray, Vol. V, p. 2801; Haskell, Vol. V, p. 2662.) In water averaging 25 ft. depth an error of 3 inches would represent 1 per cent and, with the possibility of an unmeasured variation of 1 inch at the surface, the soundings must be made within ½ inch to maintain the accuracy of ½ of 1 per cent that is claimed by the appellee's witnesses. The probability of this is left to the judgment of the court.

However, the sounding of a section is one thing and keeping the meter on it in a swiftly flowing stream is quite another. As shown by the testimony of Williams, uncontradicted by appellee, at the Niagara bridge section the meter was several feet away from the section sounded and in an area considerably larger, the apparent discharge being thus reduced by an error of about 3 to 6 per cent. (Williams, Vol. VI, p. 3531.)

The next source of error is that due to the fact that the *velocity in only a part of the section* is *observed* by the meter. (Haskell, Vol. V, p. 2739; Shenehon, Vol. I, p. 341.) In a so-called discharge measurement at the Bridge Section of the Niagara River as shown by Plate No. 5, Rec., Vol. IV, p. 2475, the velocity was observed at 21 index points. (Shenehon, Vol. I, p. 299.) As shown by the Report of F. C. Shenehon (Rec., Vol. IV, p. 2466), and Shenehon's Testimony (Rec., Vol. I, p. 352), when the meters were within 5 feet of each other their indications failed to agree within one or two per cent. The area of a meter wheel is considerably less than half a foot (Haskell, Vol. V, p. 2739), and if for the sake of argument it be granted that its revolutions correctly represent the velocity in an area two feet square with the meter at the center, the area of stream actually measured would be 4 x 21—84 square feet out of an area of over 41,000 square feet, or by observing the velocity in 2/10 of 1

per cent of the stream it is assumed by the appellee's witnesses that they know of the velocity in the remaining 99.8 per cent within ½ of 1 per cent. (Moore, Vol. V, p. 2870; Haskell, Vol. V, p. 2714.)

If the observations taken in the so-called co-efficient work be included there are by Shenehon's Report about 90 x 11—990 positions occupied by the meter (Rec., Vol. IV, p. 2469), and granting each position to cover four square feet there are about 4,000 square feet of current measured out of a total of 41,000, so that on a most liberal estimate, the velocity in 90 per cent of the stream is unmeasured and only guessed at, yet it is claimed that the discharge is known within ½ of 1 per cent.

Lack of Evidence of Accuracy. In spite of these claims of accuracy there is no evidence to support them and they must be regarded as mere expressions of opinion of more or less qualified experts. The appellee has submitted no evidence that in the disturbed water of the Niagara River the meter registers within ten or any other per cent of correctness, while appellant has shown that under similar conditions it under-registers anywhere from five to ten per cent. (Schoder, Vol. III, p. 1548.) The only basis for a claim to accuracy in the work of the complainant is in the correspondence of the discharges at different and the same sections (Haskell, Vol. V, p. 2662; Shenehon, Vol. V, p. 3170), and this is no evidence of accuracy, as each may be and probably is, in error several per cent in the same direction due to effects of turbulence, incomplete investigation of the cross section of the stream, and variations of rating of meters due to changing conditions of lubrication.

In speaking of the determination of the increment of the St. Lawrence, Mr. Shenehon, the principal witness for appellee, said (Rec., Vol. V, p. 3182):

> "We had, I believe, only 93 observations. Those were in two groups, the lower ones being in one sea-

son and the upper ones in the second season. It appears at the present time that an error did enter there. This is still in the melting pot, and we don't know our increment as accurately, or we did not know our increment as accurately on the St. Lawrence as indicated by my original testimony; that is, that is the indication from the present investigations.

* * *

I believe the error in the St. Lawrence increment as originally derived and as finally derived, is somewhere in the neighborhood, that is the difference is somewhere in the neighborhood of 10 or 15 per cent."

Major Keller, one of appellee's witnesses, stated (Rec., Vol. I, p. 229):

"A. I think that in all probability the results that I have just given are accurate within approximately 5 per cent.

Q. Can you, without going through any long mathematical process, state why you put that at 5 per cent? What is the reasoning in your mind that leads you to say 5 per cent?

A. Well, as a general rule, we have found out in our discharge measurements that the line which most nearly expresses the law of discharge will be so drawn upon a diagram that the extreme measurements, those which diverge furthest from the line, will contain an error not to exceed about 2 per cent. That in itself is probably an error that does not altogether measure the total error which appears in the measurement. It shows the internal or relative consistency of the measurements, but it does not exhibit the fact that it is possible that in addition to small errors due to the use of the meter itself, there may appear small errors due to the impossibility of measuring the cross section with absolute accuracy. And the final result will also show a very small error due to the slight errors of gage readings that may appear in the result. And while I have said 5 per cent, it is merely my opinion that the final result may show an error as large as 5 per cent. I do not believe it will show anything larger. I think all causes combined would probably aggregate at the very utmost 5 per cent."

In speaking of the error that may enter into the determination of an increment from the ice effects in these various outlet rivers, Major Keller stated (Vol. I, p. 240):

> "My conclusion, independently of that of this office, my personal conclusion is that the ice effect is a large but unknown factor in the determination of the levels of the Great Lakes; and that up to the present time the Lake Survey has not made sufficient measurements to enable any one to form a justifiable conclusion as to the measure of the ice effect, either in the St. Clair River, or in any of the other rivers; the Niagara or the St. Lawrence."

Prof. Eugene E. Haskell, one of the principal witnesses for appellee, in discussing an increment determined by the Lake Survey for the St. Clair River, said (Rec., Vol. V, p. 2735):

> "Q. The discharges would be in error 4% and the increment 40%?
>
> A. Yes."

Mr. Haskell invented the so-called Haskell current meter which was used in these determinations by the Lake Survey.

The witness F. G. Ray, who was when he testified the head of the United States Lake Survey, in speaking of the increment development for the St. Clair River, said (Vol. V, p. 2793):

> "I believe that increment may be in error from 10 to 15 per cent."

The witness Moore, in testifying as to the latest increments determined by the Lake Survey and in the employ of the Lake Survey, said (Rec., Vol. V, p. 2866, 2867):

> "I took up each of the rivers connecting the Great Lakes; examined all of the observations for possibilities of error, and made some changes and altera-

tions in gages and meter readings, which seemed indicated by the observations and by our further knowledge of the subject, and wherever necessary I derived new equations expressing the law of flow in terms of the controlling gage".

In speaking of the latest increment determined for the St. Clair River by the Lake Survey, Mr. Moore further said (Rec., Vol. V, pp. 2868, 2869):

> "The latest reduction by the Lake Survey shows an increment at mean stage of about 21,000 cubic feet per second. That, in my opinion, may possibly be in error by as much as 20 per cent."

Concerning the increment derived by the Lake Survey in 1909, Mr. Moore stated that the error was

> "Not to exceed 25% maximum possible error."

Appellee has taken the position that the Secretary of War would have the authority to authorize a diversion from Lake Michigan of 4,167 seconds feet through the Chicago River, but would not have the authority to authorize 10,000 cubic seconds feet, or a diversion materially larger than the amount first mentioned, because in the first instance there would be no obstruction to navigation, but in the second instance there would be. When the conditions assumed for the second were apparent to the Secretary of War, his authority under Section 10 of the Act of 1899 ceased and would not cover an authorization of the larger diversion which would amount to, as they say, an obstruction. The Government's determination of the effect of 10,000 seconds feet diversion from Lake Michigan, is based upon an increment of approximately 23,800 cubic seconds feet. Dividing the diversion by the increment, to determine the effect, produces the result of 5 inches (approximately), which is the amount testified to and shown by Appellee's Exhibit 1. (Appellant's Narrative, opposite page 124.) If

there is 40% error in the increment, there may be 40% error in the determination of the effect—5 inches,—so that the 5 inches should be reduced by 40%, which would give a possible result of 3 inches as the effect of diversion of 10,000 cubic seconds feet at Chicago. This is a little over half an inch more than the effect of 4,167 second feet which appellee says does not create an obstruction to navigation, ascertained according to their determination of an increment of 23,820 cubic seconds feet.

Finally, appellant submits that for the determination of the magnitude of the effect of the Chicago diversion, the actual facts, *if established*, in the language of Mr. Justice Holmes, (*Missouri* v. *Illinois*, 200 U. S. 518, *et seq.*)

> "have required for their establishment the most ingenious experiments and for their interpretation the most subtle speculations of modern science. * * * There is nothing which can be detected by the unassisted senses. * * *"

The comments as to the qualifications of appellant's witness Gardner S. Williams, have been considered by us elsewhere. (*Infra*, p. 60.)

Appellee complains, (Its Brief 93), about our reference to the testimony of Mr. Ripley as to the platform of the Poe Lock being some four inches above the mitre sill. The Poe Lock being constructed about the year 1898, Mr. Ripley testified that the platform remained thus restricting the drafts of vessels from the time it was built until he testified in the year 1913. Appellee's particular complaint is that appellee's witness DeYoung was not mentioned in appellant's narrative statement, or in the index of the record appearing as Volume A. This index was prepared for the District Court, and was merely rebound for the use of this court. The DeYoung testimony was offered by appellee, on December 19, 1914,

after the record was printed and the index had been prepared. The following statement appears in the record at the time the DeYoung testimony was taken (Vol. VI, p. 3976):

> "Mr. Adcock: No; everything is in the printed record now."

The DeYoung evidence and some other evidence offered at that time, (December 19, 1914), was merely added to Vol. VI of the record. The index was not reprinted simply to include the additional material. So counsel's severe criticism in this respect is entirely unfounded. Furthermore, the DeYoung testimony was absolutely of no value. Ripley testified as to how the lock was built. DeYoung testified as to some soundings that were made, at which he was not present, as appears in his testimony, as follows (Rec., Vol. VI, p. 3979):

> "Q. Do you know the elevation of the top of this platform that you speak of as compared with the elevation of the top of the lower mitre sill of the Poe Lock.
>
> A. I don't think I do. I think, however, it is the same elevation.
>
> Q. That is only an opinion that you have?
>
> A. Yes.
>
> Q. You don't know anything about it?
>
> A. No, sir."

114 It was not until after both appellee and appellant had presented their evidence in chief, that appellee offered any evidence as to current in the Chicago River. In April, 1914, it produced certain persons who operated boats at times upon the Chicago River. (Rec., Vol. V, p. 3020.) These witnesses had never measured the current, nor had they made any calculations as to what the current would be from the cross sections and slope of the river produced by appellant's enlargement under the July 11, 1900, permits, with a flow of 10,000 cubic seconds feet.

They only testified as to what they thought they saw at certain places, at bridge draws and other parts of the river, when there were two or more boats abreast in the stream. The mile and a quarter per hour current, which was unobstructive to navigation, with the withdrawal of 10,000 cubic seconds feet through these river channels, was ascertained by competent engineers, (Randolph, *Infra*, p. 43, and Wisner, *Infra*, p. 62). Appellee's own division engineer at Chicago, in his report (1906) found that the current with this amount of diversion would not exceed a mile and a quarter an hour (*Infra*, p. 61.) No engineer of appellee appeared to testify that the channels of the Chicago River and its branches had not been completely so enlarged that the 10,000 cubic seconds feet of water could be taken through them without producing a current obstructive to navigation.

The Secretary of War, Stimson, in his statement of January 8, 1913, took up almost every question that could possibly be presented in support of his refusal to remove the limitation of December 5, 1901. He did not mention an obstructive current in the Chicago River that was or would be produced by the 10,000 cubic seconds feet diversion. He did not therein suggest that this diversion through those river channels had caused or would would cause any injury to navigation on that river. **If a current did or would exist in the improved channels of the Chicago River and its branches, the Secretary undoubtedly would have so stated in his January 8, 1913, statement.** In any event if there were any question as to whether a current is considered unreasonably obstructive to navigation, the river channels could be easily deepened to take care of this condition. The court, without difficulty, could properly, by its decree, take care of that situation.

We will now discuss the various points of appellee's argument.

APPELLEE'S POINT I.

(Its Brief, p. 123.)

It is true that these waters of the Great Lakes and their connecting channels, are navigable waters of the United States. The International Boundary passes through some of these lakes and along some of the connecting rivers. The waters on one side of the boundary are in Canada, and those on the other are in the United States. What counsel's purpose is in calling them "high seas", we are unable to discern.

The cases referred to by counsel, turned upon the proposition that they were navigable waters of the United States, and therefore admiralty courts had jurisdiction.

In referring to *The Genessee Chief* v. *Fitzhugh*, 12 Howard 443, this Court, *in U. S.* v. *Rogers*, 150 U. S. 247, 258, said:

> "The court, perceiving that the reason for the exercise of the jurisdiction did not in fact depend upon the tidal character of the waters, but upon their practicable navigability for the purposes of commerce, disregarded the test of tide water prevailing in England as inapplicable to our country with its vast extent of inland waters."

At page 259, the Court further said:

> "We may as appropriately designate the open, unenclosed waters of the lakes as the high seas of the lakes, as to designate similar waters of the ocean as the high seas of the ocean, or similar waters of the Mediterranean as the high seas of the Mediterranean."

The Boundary Waters Treaty of January 11, 1909, very clearly defines the character of these waters. Article I referred to by counsel, merely gives the same right of navigation to the citizens of Canada on Lake Michigan, that the United States has, "subject, however, to any laws and regulations of their country within its own territory."

The word "free" has a double meaning—one, "without toll", *second*, "equal" rights.

The preliminary article defines boundary waters. Lake Michigan is not a boundary water and therefore is not subject to the treaty; in fact, the treaty expressly recognizes and reserves to the State of Illinois and the United States, the free and unlimited power to deal with Lake Michigan as the United States and the State of Illinois may consider proper for the public interest. By the treaty, therefore, Lake Michigan may be treated as if it had no connection whatever with the other Great Lakes.

APPELLEE'S POINT II

(Its Brief, p. 128.)

In some mysterious way, not disclosed, appellee seeks to gain some advantage or comfort from calling the waters of the Great Lakes "international". Since the Treaty of January 11, 1909, with reference to Canadian boundary waters, the character of and the rights of the states and the nation in the waters of the Great Lakes, whether boundary or non-boundary waters, are not open to debate or question. Suffice it to say that the rights in Lake Michigan are recognized to exist in the state and nation. They may be diverted as the state or nation may provide, subject, only, to the right of Canadian citizens to sue for injuries, or the right of Canada to object in case navigation is affected as to any diversion not settled by the treaty. As we pointed out in our original brief, p. 188) the treaty left open the question *only* of a diversion at Chicago from Lake Michigan of that amount which would be in excess of 10,000 cubic seconds feet.

Counsel make two misstatements of fact in this connection—*first*, that the work on the canal and on the Sanitary District's diversion works, was not commenced prior to the passage of the Act of September 19, 1890, and, *second*, that the canal was not completed until after the passage of the March 3, 1889, Act. On this subject we refer the Court to the testimony of Mr. Lyman E. Cooley, who was the first chief engineer of appellant, and also was closely and intimately connected with appellant's projects from their inception (Appellant's Narrative, p. 288):

> "The Sanitary District was instituted for the specific purpose of carrying out the projects which were outlined prior to its organization, and had proceeded by September, 1890, in the definitive surveys from the Chicago River to Joliet. They had also instituted surveys on the

Chicago River with a view to the definitive surveys for its enlargement. When I became chief engineer in January, 1890, I proceeded immediately to further work upon those plans for the Sanitary District. There was nothing left to do except to define the things on the ground, practically. The genius of the whole proposition from the outset, held in mind unvaryingly, was to keep the flow of sewage away from Lake Michigan as far around the rim of the lake as was practicable."

Again, Mr. Cooley states, as to the date of the completion of the canal (Appellant's Narrative, p. 292):

"The work was proceeding faster than the District could get the funds to pay for it and so the real work on the channel, the Main Channel, which was scheduled to be completed in November, 1897, was not actually completed until about November, 1898, when it was substantially completed, and the District then notified the Governor of that fact and asked for the appointment of a commission. The first action by the Board (of Trustees of Appellant) on that matter was in November, 1898, and the petition actually was transmitted to the Governor in January, 1899, as I recall it."

Mr. Cooley is the only witness who testified to these facts. There was no controversy.

We construe the Act of September 19, 1890, as treating to be lawful appellant's structures erected under its May 29, 1889, Act, as held in

United States v. *Bellingham Bay Boom Co.*, 176 U. S. 211, 44 Law Edition, 437.

This case was construed in

Maine Water Company v. *Knickerbocker Steam Towage Company*, 99 Maine, 473,

as so holding, and the *Maine Water Company case* was cited with approval by this Court in

Southern Pacific Company v. *Olympian Dredging Company*, 260 U. S. 205, 210.

A distinction is sought to be drawn by appellee, because the waters affected by appellant's works built in exercise of Illinois' police power, affect other waters than those wholly within the limits of the state. Counsel fail to recognize the distinction between an act passed in the exercise of a well-known police power reserved to the state, as here, which act has a reasonable relation to the purpose sought, from an act of the state passed directly to regulate interstate commerce. In the first instance, the effect upon interstate commerce is *incidental,* and in the latter instance, it is *direct.* In the latter instance, the whole subject is delegated to Congress, and the states have no authority. In the first instance, the state's authority exists, and if the act is reasonable, then it must be reconciled with the congressional power or exercise thereunder. In the present instance, the state's acts operate upon navigable waters outside of the state, as claimed by appellee, and through that medium affect, incidentally, interstate commerce. In the ultimate analysis interstate commerce is the particular matter involved. The case is no different from a bridge constructed over the Chicago River, or some other river wholly within the state, which would have the result of affecting boats plying between some point further within the state, than the bridge erected, and ports of other states. It is similar to a regulation such as was before this Court in

Escanaba v. *Chicago,* 107 U. S. 678.

Interstate commerce outside of the state and generally is often incidentally affected through action under the state's police power. A good example is the discriminatory effect upon interstate commerce outside the State of Minnesota before this Court in the *Minnesota Rate Cases,* 230 U. S. 352.

The case of

Chandler-Dunbar Water Power Company v. *U. S.,* 229 U. S. 51.

does not support appellee's contention, for in that case the power plants were constructed in the St. Mary's River, and

produced the effect, as counsel claim, of lowering the levels of the lakes. They were lawful structures and so considered by appellee and every one until the Act of Congress was passed specifically declaring them to be unlawful, and directing the Secretary of War and Attorney General to remove them.

Kansas City Street Railway Co. v. *Kaw Valley Drainage Dist.*, 233 U. S. 75,

is not in point, for there the Court directed the *absolute* removal of a bridge over the stream in question, which bridge carried railroad tracks, an instrument of interstate commerce. This Court in that case based its decision upon the character of the decree directing complete removal. If there had been a proper order of the Court providing for *reasonable* alteration of the bridge, as required, to prevent overflow and damage to lands, then this Court's decision would have been different.

Appellee's Point II-A.

(Its Brief, p. 132.)

Appellee here again fails to recognize the distinction between acts of the state directly operating upon interstate commerce, from those acts which only incidentally affect it and passed in the exercise of a reserved police power. Counsel quote extensively from *Minnesota Rate Cases*, 230 U. S. 352, and lay much stress upon the language contained in that opinion

> "There is no room in our scheme of government for the assertion of state power in hostility to the authorized exercise of federal power."

In the case at bar, there is no exercise of state power in *hostility* to the federal power. The state proceeded in the best way possible regarding those things over which, under our scheme of government, it has jurisdiction. It has not sought to set up any power to regulate interstate commerce, and

this distinction is plain from the very language of the opinion quoted by appellee:

> "The grant in the Constitution of its own force, that is, without action by Congress, established the essential immunity of interstate commercial intercourse from the *direct control* of the states with respect to those subjects embraced within the grant * * *."

This Court, after using the language quoted by counsel, makes its position clear beyond question. Note the following language in the *Minnesota Rate cases*, which bears out our contention:

> (P. 402) "Our system of government is a practical adjustment by which the national authority as conferred by the Constitution is maintained in its full scope without unnecessary loss of local efficiency. Where the subject is peculiarly one of local concern, and from its nature belongs to the class with which the state appropriately deals in making reasonable provision for local needs, it cannot be regarded as left to the unrestrained will of individuals because Congress has not acted, although it may have such a relation to interstate commerce as to be within the reach of the Federal power. **In such case, Congress must be the judge of the necessity of Federal action.** Its paramount authority always enables it to intervene at its discretion for the complete and effective government of that which has been committed to its care, and, for this purpose and to this extent, in response to a conviction of national need, to displace local laws by substituting laws of its own. The successful working of our constitutional system has thus been made possible.
>
> * * *
>
> But this exercise of the important power to provide local improvements has not been regarded as constituting such a **direct burden** upon intercourse or interchange of traffic as to be repugnant to the Federal authority in its dormant state."

In speaking of quarantine regulations, this Court further said:

> (P. 406) "In view of the need of conforming such measures to local conditions, Congress from the begin-

ning has been content to leave the matter for the most part, notwithstanding its vast importance, to the states, and has repeatedly acquiesced in the enforcement of state laws."

This Court clearly recognizes that Congress should be deemed to have consented to the state's action in the exercise of a reserved police power, even though it indirectly affects interstate commerce, until Congress acts in the premises. So it did in the situation presented by the case of

Chandler-Dunbar Water Power Company v. *U. S.*, 229 U. S. 51.

A similar situation existed with reference to the diversions of water at Niagara Falls for water power purposes. These diversions existed without any congressional authority and without permits of the Secretary of War. The authority for such diversions existed solely under the laws of New York, until the passage of the Act for the preservation of Niagara Falls of June 29, 1906, at which time Congress exercised its paramount authority upon the particular subject. Counsel's quotation (Appellee's Brief, p. 221) from the committee report concerning the bill introduced, bears this statement out conclusively.

In

Covington & Cincinnati Bridge Co. v. *Kentucky*, 154 U. S. 204,

there was an attempt under state authority to fix rates of charge for passage over the bridge, a direct regulation of interstate commerce, and, of course, the case is not in point on the situation presented here.

This Court applied the same principle in

Missouri v. *Kansas Natural Gas Company*, 68 Law Edition, Advance Sheets, p. 585, June 16, 1924,

and in

Public Utilities Commission v. *Landon*, 249 U. S. 236.

In the former case, the Court held that the state was without power to fix the price of gas transmitted from one state to another, where the gas was delivered to a distributing company or companies, who thereupon delivered it to the individual consumer. In the *Missouri case,* this Court distinguished *Pennsylvania Gas Company* v. *Public Service Commission,* 252 U. S. 23, solely because the gas was transmitted from Pennsylvania by the Pennsylvania Gas Company to the individual consumer. In the *Pennsylvania Gas Company case,* the price fixed for gas under the authority of the State of New York, was the price to the individual consumer, and was peculiarly a local or state matter, and therefore it was held that the state's action should be reconciled and held valid. And in the *Missouri case,* this Court, making the distinction between the facts in that case and those in *Pennsylvania Gas Company* v. *Public Service Commission, supra,* said (587):

> "In such case the *local interest* is *paramount* and the interference with interstate commerce, if any, *indirect* and of minor importance."

Appellee's Point II-B.

(Appellee's Brief, p. 135.)

The cases cited under this subheading do not support the proposition presented, for the state's actions were upheld. The distinction attempted to be made by appellee does not exist. The situations presented by those cases were instances of the state's exercise of the reserved power, which indirectly affected interstate commerce. They are authorities in support of our position.

Appellee's Point II-C.

(Appellee's Brief, p. 136.)

It is unnecessary to consider the numerous cases cited by appellee as they support our contention. We will, however,

analyze the *Wheeling Bridge case,* 13 Howard 553, for the reason that counsel lay so much stress upon it as an authority in their favor. It is cited and the opinion is quoted at length under Point II-C of their argument (page 139), and also it is cited in almost twenty other places in appellee's brief. As we understand it, for that case, counsel contend the following: (1) it disposes of the contentions of appellant as to the invitation and acquiescence of appellee in the construction, operation and attendant diversion of appellant's works; (2) it disposes also of the contention of appellant that its works interfere, if at all, but slightly with interstate commerce; and (3) appellee further makes the claim that the Ordinance of 1787 as to the Northwest Territory has the same force and effect as the compact between Virginia and Kentucky as to the free navigation of the Ohio River, sanctioned by Congress, under consideration in this *Wheeling Bridge case.*

In order that these contentions of appellee may be shown to be fallacious, we will refer to the facts in the *Wheeling case,* which are entirely unlike the facts in the case at bar. The *Wheeling Bridge case* was instituted in this court by the State of Pennsylvania against the bridge company to enjoin the construction of a bridge across the Ohio River, which river at this point was entirely within the State of Virginia. The river, however, rose in Pennsylvania and extended through the State of Virginia, and thereupon formed the boundary between Ohio and Virginia and farther down between Kentucky and Ohio. This river in Virginia was entirely different from the Chicago River and its branches as they are wholly within the limits of the State of Illinois. The Chicago River and its branches do not stand to Illinois as the Ohio River at Wheeling did to the State of Virginia. However, as they connect with navigable waters outside the state, and navigation may be carried on continuously, the Chicago River and its branches are navigable waters of the United States and the facts are similar to those presented in *Willamette Iron Bridge Co.* v. *Hatch,* 125 U. S. 1. The Willamette River forms

with the Columbia River, a highway of interstate commerce. It is navigable water of the United States. It appeared that the purpose of building the bridge as proposed was to make Wheeling the head of navigation of the Ohio River, and thus cut off Pennsylvania towns.

Whether Congress would authorize the construction of the bridge across the Ohio River of the height and length of span, as it was being constructed, was before Congress on several occasions. Pennsylvania objected. Congress refused to pass any act authorizing the structure. Mr. Stanton, in his argument, summing up the effect of these applications to Congress, said (p. 528):

> "It is manifest, therefore, that the only constitutional power that could in any event authorize this bridge had been invoked, and that by its negative action, potentially as by express enactment, this structure was prohibited."

In the case at bar, the converse was true, for from the very beginning of the discussion of the project by the people of Chicago and Illinois, and from the time the Act of May 29, 1889, was passed, the entire matter had been brought to the attention of Congress by its own officers, and its inaction must necessarily be construed to be consent and acquiescence in Illinois' program for the protection of the public health of Chicago.

Pennsylvania instituted its suit immediately upon the initiation of the construction of the bridge. Notwithstanding the pendency of the suit, the bridge company proceeded to complete the structure in a manner to obstruct navigation. How much different are the facts before this court! Congress, long before the works of appellant were commenced to be built, provided for numerous surveys for a deep waterway. These acts covered a period of a quarter of a century prior to the passage of appellant's organic act. Surveys were made recommending the building of a deep waterway and the diversion of water from Lake Michigan for that purpose. After appel-

lant's works were placed under construction, and during the period of construction and afterwards Congress passed acts looking to the utilization of its canals and the water diversion for this deep waterway. At no time did Congress refuse to authorize their operation as required by the Illinois Act.

All of appellant's diversion works were constructed prior to the institution of any suit questioning the validity of its diversion; in fact, in the very suit to which appellee refers—the Calumet River suit, started on March 23, 1908,—as we pointed out in our original brief, appellee sought only to question the right to divert water through the Calumet River and the Calumet Sag Channel, a mere adjunct of the main diversion canal, the Sanitary and Ship Canal. The principal diversion provided for was through the Chicago River and its various branches to the northern terminus of the main canal. This Calumet River suit did not in any way question the right of appellant as to the Chicago River diversion, but assumed that to be a lawful diversion, as required by state law; otherwise appellee would have at that time included this diversion within the Calumet River suit.

This Court in the *Wheeling Bridge case* also based its decision upon the compact between Virginia and Kentucky, sanctioned by Congress—

> "That the use and navigation of the River Ohio, so far as the territory of the proposed state (Kentucky), or the territory that shall remain within the limits of this Commonwealth lies thereon, shall be free and common to the citizens of the United States."

This is entirely different from the provisions of the Ordinance of 1787 for the government of the Northwest Territory—

> "The navigable waters leading into the Mississippi and St. Lawrence, and the carrying places between the same, shall be common highways, and forever free, as well to the inhabitants of said territory as to the citizens of the United States, and those of any other states that may be admitted into the confederacy, without any tax, impost, or duty therefor."

In

Willamette Iron Bridge Co. v. *Hatch, supra,*

with reference to the effect of this provision of said ordinance, this Court said (page 2):

> "This court has held that when any new State was admitted into the Union from the Northwest Territory, the ordinance in question ceased to have any operative force in limiting its powers of legislation as compared with those possessed by the original States. On the admission of any such new State, it at once becomes entitled to and possessed all the rights of dominion and sovereignty which belong to them."

Again the Court said (page 12):

> "What the people of the old States wished to secure was the free use of the streams and carrying places in the Northwest Territory, as fully as it might be enjoyed by the inhabitants of that territory themselves, without any impost or discriminating burden."

Again this Court, in the *Willamette case* in speaking of the *Wheeling Bridge case*, said (page 15):

> "But in that case (*Wheeling Bridge case*) this court had original jurisdiction in consequence of a State being a party; and the complainant (the State of Pennsylvania) was entitled to invoke, and the court had power to apply, any law applicable to the case, whether state law, federal law or international law. * * * But Virginia, in consenting to the erection of Kentucky into a State, had entered into a compact with regard to the free navigation of the Ohio, confirmed by the Act of Congress admitting Kentucky into the Union, which the court held to be violated by authorizing the bridge to be constructed in the manner it was; and the bridge, so constructed, injuriously affected a supra-riparian State (Pennsylvania) bordering on the river, contrary to international law."

See also

Huse v. *Glover*, 119 U. S. 543.

In the late case of *Economy Light & Power Co.* v. *United States*, 256 U. S. 113, this Court, in referring to *Escanaba* v.

Chicago, 107 U. S. 678, 688, 689, and *Willamette Iron Bridge Co.* v. *Hatch*, 125 U. S. 1, and other cases, said (page 121):

> "Those cases simply hold, in effect, that a state formed out of a part of the Northwest Territory has the same power to regulate navigable waters within its borders that is possessed by other states of the Union; that is to say, until Congress intervenes, the power of the state, locally exerted, is plenary; nevertheless, where the navigation serves commerce among the states or with foreign nations, Congress has the supreme power when it chooses to act, and is not prevented, by anything the states may have done, from assuming entire control in the matter. In short, that the rule laid down in *Willson* v. *Black Bird Creek Marsh Co.*, 2 Pet. 245, 252, 7 L. Ed. 412, 414, and *Gilman* v. *Philadelphia*, 3 Wall. 713, 731, 18 L. Ed. 96, 101, applies to states formed out of the Northwest Territory as well as to others. This is not questioned."

As to the effect upon the commerce that would result by the construction of the Wheeling bridge, it appeared that the facts as to this question had been referred to a Master and found against the bridge company. Furthermore, the bridge was almost entirely constructed after Pennsylvania instituted the suit, so there were no equities in favor of the bridge company. Notwithstanding this fact, however, this Court suspended the operation of the decree giving the bridge company the opportunity to change its bridge as directed by this Court so that it would not unnecessarily obstruct navigation. This Court, in speaking of its action in the *Wheeling Bridge case*, said (*Willamette Iron Bridge Co.* v. *Hatch*, *supra*, page 16):

> "But to mitigate the apparent hardship of such decree, if executed unconditionally, the court, in the exercise of a merciful discretion, granted a stay of execution on condition that the bridge should be raised to a certain height, or have a draw put in it which would permit boats to pass at all stages of the navigation."

In

Miller v. *State of New York*, 109 U. S. 385,

it does not appear that the Act of Congress approving the plans of the bridge, was necessary, but this Court intimated

that without the congressional Act, its decision would have been the same, as the bridge was constructed under the authority of the State of New York at a time when Congress had not assumed any jurisdiction of such structures. And this Court cited

Gilman v. *Philadelphia*, 3 Wallace 713,

in which case a bridge over the Schuylkill River, Chestnut street, in the City of Philadelphia, connecting two parts of said city, was held to be a lawful structure, having only the legislative sanction of the State of Pennsylvania.

Appellee's Point II-D.

(Appellee's Brief, p. 151.)

Appellee cites

Economy Light & Power Company v. *United States*, 256 U. S. 113,

and seeks to argue that the Ordinance of 1787 of the Government of Northwest Territory, limits the action of Illinois the same way this Court held Virginia to be limited by the compact between Kentucky and Virginia, considered in that case. We have heretofore pointed out the distinction fully, and have shown that the Ordinance of 1787 was in no respect similar to the compact between Virginia and Kentucky mentioned.

Appellee's Point II-E.

(Its Brief, p. 154.)

Here counsel seek again to give some undisclosed effect to calling the waters of the Great Lakes "international." We will later discuss this subject more fully, where we deal completely with appellant's argument as to the force of the treaty (*Infra*, p. 85), as we believe the treaty fully disposes of all appellee's contentions.

APPELLEE'S POINT III.

(Its Brief, p. 159.)

At the outset, appellee's counsel seem to have forgotten the circumstances under which the Chicago River and its branches were enlarged. In construing Section 10 of the 1899 Act, it must be borne in mind that the Secretary of War was authorized only to do certain things. In the case of structures mentioned in said Act, he was empowered to approve the plans recommended by the Chief of Engineers. In the case of excavating or filling or altering or modifying the course or location, it was not to be done *"unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same,"* that is, the **work** of excavating or filling, or the **work** of altering or modifying. There was no authority for the Secretary of War to act, except under those conditions. We have pointed out that the work of excavating and filling and connecting the Sanitary and Ship Canal with the West Fork of the South Branch of the Chicago River, was authorized under the permits for the improvement of the Chicago River —the improvement beginning with July 3, 1896, permits, the more comprehensive improvement under the permits of July 11, 1900, and the permit of May 8, 1899, providing for the opening of the channel. As early as April 21, 1891, the Secretary of War was advised by being delivered a copy of the ordinance of that date adopted by the board of trustees of appellant, expressly stating its purpose *"to make"* the Chicago River and its branches *"a proper and sufficient supply channel for the Main Channel heretofore surveyed from the Chicago River to Joliet."* (Appellant's Narrative, p. 454.) In the application for the permit of July 3, 1896, which was the initial one for the improvement of the Chicago River, it was stated that appellant's work had prog-

ressed so far that it was necessary to enter upon that which should be done to make the Sanitary and Ship Canal available. The purpose of the work was disclosed. The same was true of the applications for the permits of July 11, 1900, under which the Chicago River was finally improved for the increased diversion—10,000 cubic seconds feet.

Appellee's counsel are in error when they state in substance that there was nothing done prior to March 3, 1899, by appellant "affecting in the slightest any navigable waters of the United States, except the accomplishing of certain improvements in the Chicago River." (Appellee's Brief, p. 160.) The excavations in the channels of the Chicago River were not mere boyish pranks of appellant. They were serious acts in the interest of the public health. The purpose was well known to the government officers, for they had been definitely advised. Mr. Lyman E. Cooley testified with reference to these improvements in the Chicago River and its branches (Appellant's Narrative, p. 294):

> "The improvement made prior to the opening of the channel was simply preliminary improvement. It was recognized that in order to obtain this flow in the quickest possible time and at the lowest possible expense, that there would have to be a wholesale improvement, such as was undertaken in 1900.
>
> * * *
>
> The Chief Engineer of the District went ahead and made an exhaustive survey of the Chicago River from Robey street to the lake, defining all property rights and cross sections of the stream, with a view to definitive plans for the improvement of the river. And these surveys were completed prior to 1895. They were followed by definite plans for the improvement of the river, which were inaugurated in 1896, in co-operation with the United States, which made an appropriation for the improvement of the river in that year; and the river was improved to a depth of twenty feet by dredging the stream. And the bad angles in the stream were cut off, and in some places the river was widened, and in the vicinity of Adams street and Jackson street, by-passes were con-

structed at the constricted parts of the river, in that vicinity, for the purpose of giving the preliminary flow required by the Sanitary District law of 300,000 cubic feet at the velocity of one and one-fourth miles per hour.

These surveys were also used as the basis of the larger improvement which was immediately defined and inaugurated after the opening of the channel in 1900, for a capacity of 10,000 feet per second.

That plan consisted in bascule bridges in the stream of a uniform width of 200 feet, and a central depth of twenty-six feet; and has also been carried out in part with the co-operation of the United States.

The capacity of the Main Channel at the Rock Section was actually 840,000 cubic feet per minute.

The occasion for making further improvement in the Chicago River and its branches after 1900, by the Sanitary District, was to get the increased capacity which was required with the growth of population, after the initial capacity of 300,000 feet had been established, and to accommodate 600,000 feet by way of the Chicago River, and later that was supplemented by the flow by way of the 39th Street conduit.

That new improvement or the improvement after 1900 was known as the Chicago River Improvement Project of 1900.

If the flow through the Sanitary District Canal had been limited to 5,000 cubic feet per second after 1900, it would not have been necessary for the Sanitary District to have made the changes and alterations in the Chicago River that it subsequently did make after 1900."

Again, speaking of the improvement of the Chicago River and its branches, Mr. Cooley stated (Appellant's Narrative, p. 299):

"The Chicago River prior to this improvement was little more than an adaptation of the Chicago Creek, which was known before Chicago was here; and its capacity for carrying a flow of water was limited. It is difficult to make a comparison where the stream was so little adapted to the present purpose, and where the change has been so radical.

Originally the Chicago Creek carried twelve feet up to the Forks, and its original improvement, the first im-

provement, was based on a depth of thirteen feet, which was subsequently increased to sixteen, and the tunnels built under the river limited the use of the Chicago River to sixteen feet, until they were removed within a comparatively recent period. They were removed by the city at a very considerable cost, which should be added to the expenditure of the Sanitary District and the United States, in getting at the true cost of the improvement of the Chicago River.

When the Sanitary District entered upon the improvement of the Chicago River, it was approximately sixteen feet in depth.

The depth has been increased to approximately twenty-six feet, and that is the depth carried through the main channel, to the power house.

There were portions of the river that would run up to 200 feet and even 300 feet in width, and again other portions that were less than 100. The narrow portions have been widened, or are being widened, except a very limited area near the Pennsylvania Central Station, which has been greatly delayed.

It has been widened to a large extent throughout its entire length, the Chicago River and the South Branch, so much so that it could almost be considered a new river."

Mr. Isham Randolph, who was Chief Engineer of appellant at the time the comprehensive improvement of the Chicago River for the larger diversion was laid out and, also, during a considerable period of the channel enlargement, stated (Rec. Vol. VI, p. 3593, *et seq*):

"Q. Did you have anything to do with the so-called project of 1900, for the improvement of the Chicago River, and with the preparation of the plans for that project?

A. It was my project, and the plans were prepared under my direction.

Q. Were those plans submitted to the Secretary of War and Chief of Engineers, and approved by him?

A. Yes, sir.

Q. What did you take into consideration in determining the plans for that improvement?

A. I took into consideration that we wanted to pass through the main river, through the South Branch of the Chicago River as far as the Stock Yards Branch 480,000 cubic feet a minute.

Q. That would be about 8,000 cubic feet per second?

A. 8,000 cubic feet per second. We wanted to take in through the 39th street conduit 2,000 cubic feet per second, 120,000 a minute, making a total of 10,000 cubic feet from the junction of the Stock Yards Branch with the main river.

Q. Did you take into consideration what the mean current would be through the Chicago River and the South Branch and West Fork?

A. I figured it on the basis of a shade under a mile and a quarter an hour, except in bridge openings where it was slightly contracted.

Q. That was the current which the Secretary of War considered proper for navigation purposes, was it, at that time?

A. Yes, sir.

Q. Now there were some modifications of the May 8th, 1899, permit, whereby the flow of water was limited. After about 1902, did you as Chief Engineer attempt to keep the flow within the limits of the permit as stated by the Secretary of War?

A. Up to June, 1902. I conformed fairly well to those figures. After that we exceeded them, and paid very little attention to that from that time on.

Q. That is in 1902, improvements were made in the Chicago River so as to create a greater cross section for the flow of water?

A. In that year we excavated 600,000 cubic yards of earth from the river and we built 4,700 feet of new dock. The narrowest place in the river was beyond 22nd street. It was only 115 feet wide, and we enlarged that to 200 feet; 26 foot, mid-channel depth.

Q. In other words those improvements were such that a current would not be created of more than a mile and a quarter an hour with a flow exceeding the limitations which had been indicated by the Secretary of War?

A. That was true, wherever our channel was completed. There were some few narrow spots where the current still exceeded that.

Q. There were not very many of those places?
A. And not very serious.
Q. Rather immaterial, were they?
A. Yes, sir."

Wisner's Exhibits 7, 8, 9, 10 and 11 (Appellant's Narrative, opposite page 393) show the extent of these improvements in the Chicago River under the so-called 1900 project to accommodate the greater diversion. In speaking of the tunnels under the Chicago River, removed by direction of Congress in connection with this river widening and at the suit of the City of Chicago, Mr. Wisner stated (Appellant's Narrative, p. 399):

> "This prevented the deepening of the river for some time, as the top of the channel was about, as I remember, 20 feet below the surface, 20 or 21 feet below datum."

The same was true of the channel at LaSalle Street, under the main river.

As stated by the witnesses, it is obvious that it was necessary to deepen and widen the channels of these rivers, so that the necessary volume of water could be drawn through them to the Sanitary and Ship Canal. Appellee's counsel attempt to belittle this statement. It is plainly evident, according to the laws of gravity. Anyway, there is no dispute about it in this record, as there is no evidence contrary to appellant's witnesses.

In

West Chicago Street Railway Company v. *Chicago*,
201 U. S. 505,

cooperation of the Federal Government appears by the records of this Court. The Chicago River proper was deepened at the expense of the United States to conform to the deepening of the South Branch and West Fork by the appellant. The government's work was thus done in cooperation with appellant and the City of Chicago. The City of

Chicago, to remove the tunnels in order to provide this depth, by ordinance found the tunnels to be obstructions to navigation, and directed their removal. The Rivers and Harbors Act of March 3, 1899, the very act under which appellant is seeking to limit the diversion, contained the following item:

> "Improving Chicago river in Illinois: Survey and estimate of cost for a channel twenty-one feet deep from its mouth to the stock yards on the south branch, and to Belmont avenue, on the north branch, so far as may be permitted by existing docks and wharves, exclusive of cost of removing or constructing bridges or piers or lowering tunnels; and the aforesaid depth of twenty-one feet is hereby adopted as the project depth for the improvement in lieu of that fixed by the act of June third, eighteen hundred and ninety-six (29 Stat. at L. 202, chap. 314): *Provided,* That all the work of removing and reconstructing bridges and piers and lowering tunnels necessary to permit a practicable channel with said depth to be obtained shall be done, or caused to be done, by the city of Chicago, without expense to the United States."
>
> 30 Stat. at L. 1156, Chap. 425,
> *West Chicago Street Railway Company* v. *Chicago, supra,* 516.

Other acts of Congress and facts bearing upon this matter are set forth herein. (*Infra,* pp. 104-110.)

So it is apparent that even before the appellant's Sanitary and Ship Canal was opened, Congress had been advised of the project for comprehensively deepening and widening the Chicago River to make it of depth for the withdrawal of water through it as required by the state law and for navigation purposes, and that Congress sought to cooperate in this improvement. And this Court, in

West Chicago Street Railway Company, supra,

held that it was unnecessary to obtain the permit of the Secretary of War, as the Congressional Act, above quoted

(p. 527), "*meant to give the assent of the United States to any work done by the city towards accomplishing the end which the government had in view.*" If a permit of the Secretary of War were unnecessary in that instance, it was equally unnecessary so far as the Sanitary District's improvement of the Chicago River was concerned, and the use thereof resulting from such deepening and widening. **Congress itself had expressly approved these works.**

Appellee's counsel state (Appellee's Brief, p. 161):

> "The mere excavation of a ditch in the interior of a city, is of no concern to the Federal Government."

They are speaking of the Sanitary and Ship Canal, completed the latter part of the year 1898. The same position, however, was not taken as to the Calumet Sag Channel. As soon as construction on that channel was started, the Calumet River suit was commenced, March 23, 1908.

Appellee's Point III-A.

(Appellee's Brief, p. 163.)

It is difficult to tell at what counsel are driving. We do not disagree with counsel, so far as this record is concerned, that when Congress seeks to act in making complete and full regulation of all subjects whereby navigable waters may be affected, it may do so. Whether an act of Congress in effect excluding the state's exercise of police power on this subject would be constitutional, is not now before this Court. We say that Congress has not by any act, in those plain and unmistakable terms necessary to express its will, intended to delegate to the Secretary of War power to regulate diversions from Lake Michigan by appellant for sanitary purposes.

Appellee's Point III-B.

(Appellee's Brief, p. 164.)

Counsel here quote at length from
United States v. *Rio Grande Dam & Irrigation Co.*,
174 U. S. 690.

There was no consent of the Secretary of War for the diversion of the head waters of the Rio Grande River for irrigation purposes. The diversion contemplated by this dam would accomplish the taking of substantially all the waters of the river at the point where the dam was to be constructed. The Court said (p. 709):

> "It does not follow that the courts would be justified in sustaining any proceeding by the attorney general to restrain any appropriation of the upper waters of a navigable stream. The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact."

There is no allegation in the bill in the main channel suit that the diversion of water in excess of 4,167 seconds feet substantially or materially interferes with the navigable capacity of any of the waters of the United States; nor is there any allegation that there is or will be a material injury to interstate commerce by said diversion. The case is not an authority to the effect that appellant required more for the building of its Sanitary and Ship Canal than the authorization by the State of Illinois, for the Act of Illinois amounted to an authorization by law of any obstruction to navigable waters of the United States resulting from carrying out the provisions of said Act. This Court said, in the *Rio Grande Dam & Irrigation Co. case* (p. 703):

> "The power of the State to thus legislate for the interests of its own citizens is conceded, and until in some way Congress asserts its superior power, and the

necessity of preserving the general interests of the people of all the states, it is assumed that state action, although involving temporarily an obstruction to the free navigability of a stream, is not subject to challenge."

The Act of March 3, 1899, does not help counsel. That Act was prospective in its operation, for it refers to things thereafter to be done. Appellant's canal was then built. This reasoning is supported by the language in Section 18 of the March 3, 1899, Act, where it gives the Secretary of War jurisdiction to cause the alteration of a bridge *"now constructed or which may hereafter be constructed."* If it had been the intention of Congress that Section 10 should apply to structures theretofore constructed, Congress would obviously have clearly stated its intention, as it did in Section 18 in relation to bridges.

In *Economy Light & Power Co.* v. *United States*, 256 U. S. 113 (Appellee's Brief, p. 167), the dam across the Desplaines River, under construction when the suit was instituted, had neither state nor federal sanction. The Secretary of War had not given his assent and the State of Illinois had in no way authorized it. The only question involved was whether the Desplaines River was a navigable water of the United States. If it were found to be such, as the Court did conclude, then obviously the authority did not exist in the Economy Company to build the dam. *Cummings* v. *Chicago*, 188 U. S. 410.

Southern Pacific Co. v. *Olympian Dredging Co.*, 260 U. S. 205 (Appellee's Brief, p. 168) related to the construction of a bridge over the Sacramento River. The structure was specifically mentioned in the 1899 Act. The same is true of the dam mentioned in the *Economy case*. This Court stated that the Congressional legislation of 1899 committed to the Secretary of War *"administrative power in so far as administration was necessary."* There is no suggestion that such act committed to the Secretary of War power to

regulate the state's action, such as, the diversion of water from Lake Michigan under the state's police power and in the interest of the public health, or in connection with the improvement and maintenance of its waterways. These broad questions were left to the states to solve according to the judgment of their legislative bodies—always with the understanding that Congress might exercise its dormant power in case the state's action was not in keeping with its plans and purposes.

Appellee's Point III-C.

(Appellee's Brief, p. 168.)

Counsel say (Appellee's Brief 169):

> "That the words 'affirmatively authorized by law' did not cover the obstruction caused within the state but affecting the navigable capacity of waters outside the state is clear from the opinion of this Court in *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 698."

This is obviously a misstatement of the holding in that case. In the first place, New Mexico was a territory, and in the second place there was no authorization for the construction of the dam by the Secretary of War under the 1890 Act. Had the latter existed, as the Court held, the dam would have been considered to be a lawful structure. The fact that navigable waters outside the state would be affected did not enter into the decision of that case, so far as legislative and administrative authority was concerned. A *non sequitur* follows when counsel state (Appellee's Brief, p. 169).

> "There is, therefore, no doubt as to the meaning and intent of the words 'affirmatively authorized by Congress' as they appear in Section 10 of the Act of 1899."

Cummings v. *Chicago*, 188 U. S. 410, and *Montgomery* v. *Portland*, 190 U. S. 89, cited by appellee (Appellee's Brief,

pp. 203, 204) merely hold that as to the particular structures named in Section 10 of the 1899 Act, state action was necessary to authorize their construction. Also, these cases hold that when the Secretary of War authorized same, pursuant to the recommendation of the Chief of Engineers, they were lawful structures. We argue from those cases that the only legislative action required under either the 1890 Act or the 1899 Act was appellant's organic act of the General Assembly of Illinois, May 29, 1889. No legislative authority by Congress was required. The work of excavating and filling, and the work of altering or modifying the navigable waters of the Chicago River and its branches, which would result, as appellee claims, in the altering or modifying of other navigable waters of the United States, was authorized by the Secretary of War under the various permits mentioned. Even Congress had assented to it by the Act of March 3, 1899, mentioned in the case of

West Chicago Street R. R. Co. v. *Chicago*, 201 U. S. 505.

See also other acts of Congress mentioned herein. (*Infra*, pp. 104-110.)

So in

United States v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690,

had the Secretary of War authorized the construction of the dam or approved the plans therefor, as recommended by the Chief of Engineers, this Court would have refused to reverse the case and would have held the dam, when constructed, to be a lawful structure.

We are sorry that counsel were unable to see the application of *International Bridge* v. *New York*, 254 U. S. 126, (Appellant's Original Brief, p. 181, Appellee's Brief, p. 172) for it was claimed that because it was an international bridge, Congress had

> "assumed such control of it as to exclude any intermeddling by the state."

International commerce was carried on over this bridge. Even that fact did not move this Court to exclude the state from the exercise of those powers reserved to it, though this did affect the operation and maintenance of the international bridge.

Appellee's Point III-D.

(Appellee's Brief, p. 174.)

Counsel again fail to give any consideration to the purpose and effect of the permits for the enlargement of the channels of the Chicago River and its branches. There never was any question as to why the river channels were to be widened and deepened. The Act expressly provided how much water should be diverted from Lake Michigan. The ordinance of appellant and requests for permits stated the purpose of deepening and widening the Chicago River to make it a supply channel connecting Lake Michigan with the northern terminus of the Sanitary and Ship Canal, through which the necessary amount of water could be withdrawn. By some process of reasoning, appellee here claims that an authorization by the Secretary of War upon the recommendation of the Chief of Engineers for the work of excavating and filling to accomplish the withdrawal from Lake Michigan of 10,000 seconds feet would be invalid, and beyond the power of the Secretary of War. At the same time, counsel maintain that the so-called authorized diversion of 4,167 cubic seconds feet is lawful. In other words, while the Secretary of War is delegated the authority of determining what work he will authorize on the recommendation of the Chief of Engineers, yet if he should err in his judgment, to the extent that such work would cause an obstruction to navigation, then his authorization would be invalid. We presume that counsel are endeavoring here to meet our proposition that the July 11, 1900, permits, in authorizing the

work of excavating and filling in the Chicago River and its branches, approved the diversion resulting therefrom. Counsel further, in their reasoning, assume that the diversions resulting from this work so authorized under the July 11, 1900, permits, have obstructed navigation. Therefore, as they say, the Attorney General, acting under the supposed authority of Section 12, would have the power, if he believed, or somebody told him, or in some other way he came to the conclusion, that the diversion was an obstruction, to proceed by injunction to restrain its continuance. According to counsel's contention, when the Secretary of War reaches the conclusion that a proposed structure, or proposed work of excavating or filling, will amount to an obstruction, his power ceases. An authorization approving the plans of such structure, or authorizing the work, would be of no force. This is certainly not the correct construction of Section 10. The Secretary of War, by authorizing the work of excavating or filling, found, so far as the United States is concerned, that such work, and the results thereof, are not obstructions to navigation.

Congress has authorized the Secretary of War to approve plans of bridges, and to authorize work of excavating, etc., as recommended by the Chief of Engineers, and when such plans have been approved, and a bridge is constructed thereunder, and excavation is done, according to the plans, the bridge is a lawful structure, and the work and the results thereof are lawful, even though navigation is obstructed. The Secretary of War is the arm of Congress in this respect, and the situation is not unlike that presented in the second *Wheeling Bridge Case*, 18 Howard 421.

Congress declared that bridge a lawful structure, which this Court had theretofore found to be an obstruction to navigation. This Court held the Congressional Act valid.

Counsel again (their brief, p. 178), indicate that they consider the acts of appellant in deepening and widening the

Chicago River, rebuilding bridges at an expense of upwards of $10,000,000, as merely the cavortings of a child. For what purpose did appellant make this vast improvement, all of which was authorized by the Secretary of War? As stated by Mr. Cooley (*Infra*, p. 42), there was no occasion for deepening the Chicago River from seventeen to twenty-six feet, and widening it at all points to 200 feet, if appellant were to be confined to the 4,167 seconds feet diversion. True, it would have been possible for appellant to have closed the bear trap dam at the southern terminus of the Sanitary and Ship Canal and operated it after the channels of the Chicago River and its branches were excavated for the larger diversion, if it by law could have done so. The situation is just the same as if there were no controlling works at the southern terminus of the Sanitary and Ship Canal, for appellant was mandatorially directed by the state law to build a canal of not less than 10,000 cubic seconds feet in capacity, and to maintain a flow through it to the amount of 20,000 cubic feet per minute for each 100,000 of population. (Sections 23 and 20, Act May 29, 1889, Appellant's Narrative, pp. 71-72.) So when the excavation in the channels of the Chicago River and its branches was made, it was compelled by law to so operate its channel and its controlling works, that that amount of water would be withdrawn.

Furthermore, under Section 21 of its organic act, (Appellant's Narrative, p. 71) appellant could have been forced by action of the Attorney General of Illinois or the State's Attorney of any county along the Desplaines and Illinois Rivers, to so operate its canal by withdrawing from Lake Michigan the larger diversion, as contemplated by the work authorized under the permits of July 11, 1900.

Counsel quote at length from

Hubbard v. *Fort*, 188 Fed. 987,

and rely upon it in support of their construction of Section 10 of the 1899 Act. As we stated in our original brief, (p.

138) *Hubbard* v. *Fort, supra,* is contrary to the case upon which we rely, *Maine Water Company* v. *Knickerbocker Steam Towage Company,* 99 Me. 473. The latter case was cited, as before stated, with approval by this Court. (Our original brief, p. 139.) So far as we are able to ascertain, *Hubbard* v. *Fort* has never been even cited by any Federal Court. In addition, the *Maine Water Company* v. *Knickerbocker Steam Towage Company case, supra,* has been cited with approval in

Garrison v. *Greenleaf Johnson Lumber Co.,* 215 Fed. 576, 580 (C. C. A. 4th).

Counsel fail to understand the dissections of the 1899 and 1890 Acts made by us (our original brief, pp. 133-136.) We assumed that counsel would find this dissection convenient, in elaborating the analysis made by the Court in the *Maine Water Company case.*

Appellee's Point III-E.

(Its Brief, p. 181.)

Many cases are cited, among others, *United States* v. *Chandler-Dunbar Water Company,* 229 U. S. 51. We are not here concerned with the question whether Congress may exercise paramount control over the Chicago diversion. It has not done so. Until it acts, the diversion is lawful. This the Court held to be the law in the *Chandler-Dunbar case, supra.*

Appellee's Point III-F.

(Its Brief, p. 184.)

At the outset, counsel say (their brief, p. 184):

"It will be recalled at the very outset, in granting the permit of May 8, 1899, the Secretary of War entertained grave doubt as to his power to authorize the diversion

of water by appellant. This was the reason for the incorporation of the first condition in that permit, namely, that it should 'be subject to such action as may be taken by Congress.'"

How counsel can reach this conclusion from the facts and circumstances of this case, is difficult to even guess. The Secretary of War undoubtedly advised by the Judge Advocate General, concluded that the Illinois Act of May 29, 1889, was sufficient legislative authority that the exercise by the state of its reserved police power, was lawful until Congress acted. In order that there might be no question, the Secretary of War inserted the condition 1 referred to, as to Congress's future action, which was and is the law anyway.

In refusing to issue the permit for the reversal of the flow of the Calumet River, Honorable William Howard Taft, then Secretary of War, issued a memorandum which contained the following statement (Appellant's Narrative, p. 79):

"The application of the Sanitary District is for leave to reverse the flow in the Calumet River in such a way as to make the water to flow out of the lake instead of to flow into it and to discharge the water from the Calumet River into the Drainage Canal. The Chief of Engineers was at first of opinion that such a change in the flow of the river *it* was not within the power of the Chief of Engineers to recommend, or within the power of the Secretary of War to permit. This expression of opinion as to the construction of the statute was submitted to the Judge Advocate General, who holds that Section 10, as quoted above, applies to this case and that it is one in which work could be allowed under the recommendation of the Chief of Engineers and the permission of the Secretary of War. Upon the construction of the Judge Advocate General I requested the Chief of Engineers to make his recommendation. * * * Between two such great interests, the decision must be affected more or less by large public policy and expediency, and while I agree in the construction of the Judge Advocate General that the issue is left by statutes to the recommendation of the Chief of Engineers and the concurrent deci-

sion of the Secretary of War, it may be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States."

The effect of the so-called decision of Secretary of War, Stimson, of May 8, 1913, has been fully discussed in our original brief (pp. 205, 206). Counsel have made no new points, and it is unnecessary to reiterate our argument there made.

APPELLEE'S POINT IV.

(Its Brief, p. 189.)

Appelle's counsel here, in their preliminary argument under Point IV, assume, which is not a fact, that appellant in diverting the waters of Lake Michigan to the amount of 10,000 cubic seconds feet, is violating Section 10 of the Act of 1899. They assume that Section 10 of that Act covers the Chicago diversion, and that the Secretary of War has not authorized the work necessary to accomplish the diversion, and has not, therefore, authorized the diversion itself. They say (Appellee's Brief, p. 190) that the amount as compared with the flow of other streams and with the flow of the outlet rivers, necessarily shows that an obstruction to navigation exists. Some mention is made (Appellee's Brief, p. 190) that

> "appellant made no effort to rebut the testimony of appellee's witnesses on this subject, all men of experience and standing",

in the Calumet River suit. The fact is that the Calumet River suit was consolidated with the Main Channel suit instituted on October 6, 1913, and all testimony taken in the first suit was treated as if taken in the second suit, so far as such evidence was material. Many witnesses were produced by appellant who testified as to the inaccuracy of appellee's deductions. The statements of the Chief of Engineers, of the Officers of the United States Lake Survey and of the International Waterways Commission as to the amount of the lowering of the levels of the Great Lakes due to a diversion at Chicago, were the conclusions reached in the same way that similar conclusions were testified to by appellee's experts in this case.

Appellee's counsel mention the statement of appellant's Chief Engineer before the Secretary of War,—that he did not desire

> "to question the accuracy of the figures or the fairness of the calculations—* * *"

This statement was made for the purpose of the hearing before the Secretary of War upon the application of appellant that the Secretary of War remove the limitation of December 5, 1901, due to the fact that the Chicago River had been then improved under the Secretary of War's permits of July 11, 1900. (Rec. Vol. VI, p. 3701.) The above statement of the Chief Engineer of appellant immediately succeeded the following sentence:

> "If all the theories can be relied upon, the observations are accurate, and calculations fairly made, it is probable that such a diversion would be theoretically determined as affecting the level of Lake Michigan to the extent of about five inches."

Obviously, the statement of appellant's Chief Engineer referred to by appellee's counsel, was intended to be made only for the purpose of the proceeding before the Secretary of War. That is, he did not wish to go into a complicated analyzation of the conclusions of appellee's officers on this subject. Previously, the Chief Engineer in his statement (Rec., Vol. VI, p. 3696), in referring to the calculations made, said:

> "To indicate the different results obtained, attention may be called to the estimates given in the report upon the Chicago Drainage Canal by the International Waterways Commission (1907), page 7, wherein the effect of the withdrawal of 10,000 cubic feet from Lake Michigan at Chicago upon the St. Lawrence River at Rapide Plat is stated as four-tenths of a foot. This is approximately 4¾ inches.
>
> The brief submitted by the Dominion of Canada, to which is affixed the signature of the engineers who prepared the data therein contained, gives the effect at the same point, of the same diversion, as 6.8 inches. This is a difference of nearly 50 per cent. and is a fair indication of the lack of accuracy with which compilations can be made as to the effect of a diversion from a given body of water. Generally no two engineers figuring upon this effect arrive at the same result. This is to be expected by reason of the unknown quantities entering into the computation, and also because in making the computation

the data obtained by the Lake Survey cannot all be used, and the results must vary according to the data that may be utilized."

Counsel refer to appellant's principal hydraulic witness, we presume Mr. Gardner S. Williams. Mr. Williams thoroughly analyzed appellee's witnesses' statements as to the effect upon the lakes. He was competent to do so. His qualifications were of the highest, having been for many years engaged in work where calculation of the flow of water was required. He was for a considerable time Professor of Engineering at Cornell University. Later, for a number of years, he was Professor of Engineering at the University of Michigan, and had been engaged also in private consulting engineering practice of great magnitude. (Appellant's Narrative, p. 134.)

Appellant's other witnesses, on the hydraulics of the Great Lakes, corroborated Mr. Williams' calculations. They reached the conclusion, as stated in the statement of the case (our original brief, p. 63) that the observations made by appellee's witnesses as to the discharge of the different outlet rivers of the lakes were not sufficiently accurate to entitle any definite conclusions to be reached as to the effect of a diversion of 10,000 cubic seconds feet at Chicago; that there were many elements entering into the processes by which appellee's witnesses reached the conclusions as to the lowering effect, which would necessarily cause inaccurate results.

Mr. Williams merely stated on cross examination, (Appellant's Narrative, p. 141) that from his study of the conclusions of appellee's witnesses, that the lowering could not be over 4.1 inches for Lakes Michigan-Huron, assuming 10,000 cubic seconds feet diversion.

We have pointed out the inaccuracy of appellee's conclusions as to the evidence concerning injury and damage to commerce on the subject of appellee's statement of the case (Appellant's Brief, p. 65.)

Finally, appellee refers to a current in the Chicago River, as follows (Appellee's Brief, p. 192):

> "We do not believe that appellant will gain-say that it has created and is maintaining a current of a greater rapidity."

The inaccuracy of this statement is clearly refuted by the report of May 22, 1906, of Col. William H. Bixby, U. S. Engineer at Chicago, later Chief of Engineers, entitled:

> "Effect of withdrawal of water from Lake Michigan by the Sanitary District of Chicago".

As to the rate of flow in the Chicago River that would exist after the work of deepening and widening the river under the July 11, 1900, permits, was completed, he stated (Rec., Vol. IV, p. 2397b):

> "17. In the capacity of sewer to properly carry off all the diluted sewage which the sanitary district must dispose of in the future, the South Branch and West Fork of Chicago River and the district drainage canal will need the use of the full cross section now being given to them at their typical points of construction, viz., 4,700 square feet in South Branch, Chicago River, where a future 8,000 cubic feet per second is now asked for; 5,200 square feet in West Fork, South Branch, Chicago River, 5,412 square feet in the earth sections and 3,542 square feet in the rock sections of the drainage canal, for all of which 10,000 cubic feet per second is now asked for; and 5,412 square feet in the lower (south) end of the drainage canal, where 14,000 cubic feet per second is now being asked for. I assume that after this volume of water reaches the Des Plaines and Illinois rivers it can be taken care of more easily than in the Chicago River and that the 2,800 square feet cross section of the proposed 14-foot waterway, now under consideration by Congress, will be supplemented sufficiently by the rest of the natural river on each side of the improved boat channel. The above cross-sections, so long as no boats lie at wharves or pass up and down the river, will allow the passage of the 8,000 cubic feet per second through the South Branch, with average velocities of not exceeding about 1.2 miles per hour (1.7 linear feet per second); 10,000 cubic feet through the West Fork, with average velocities of not exceeding about

1.3 miles per hour (1.9 linear feet per second), and the same flow through the earth sections of canal at not exceeding 1.2 miles per hour (1.8 linear feet per second), and through the rock section of canal at not exceeding 1.9 miles per hour (2.8 linear feet per second); and 14,000 cubic feet through the lower end of canal at not exceeding 1.8 miles per hour (2.6 linear feet per second.)"

In conclusion, Colonel Bixby stated in this report (Rec., Vol. IV, p. 2397d), as follows:

"25. Summing up the above it may be briefly stated, therefore, that 10,000 cubic feet per second diversion of water from Lake Michigan into the drainage canal will be, probably, not unreasonably obstructive to navigation and injurious to property if divided up into 6,000 cubic feet per second through the main river and south branch, increased by 2,000 cubic feet per second more through the Thirty-ninth street sewer and 2,000 cubic feet per second more through Calumet River (10,000 cubic feet per second in all), but that an increase in these amounts to 8,000, 2,000, and 4,000 cubic feet, respectively (14,000 cubic feet per second in all), will probably prove to be unreasonably obstructive and injurious."

Appellant's witness, George M. Wisner, testified as to the current in the Chicago River with a diversion of 10,000 seconds feet and with the Chicago River deepened and widened under the permits of the Secretary of War of July 11, 1900, as follows (Appellant's Narrative, page 186):

"In the South Branch the critical point probably, the critical stretch, is from Lake street to the turning basin at Ashland avenue. This will safely take, in my opinion, 8,000 cubic feet a second. From there on to the Drainage Canal, the river is much wider, and with the same depth would take an additional flow of water without any injury to navigation.

The current would not exceed 1¼ miles an hour through that stretch anywhere."

Mr. Isham Randolph, who laid out the project for the enlargement of the channels of the Chicago River and its branches for the diversion of 10,000 cubic seconds feet

through them to the Sanitary & Ship Canal, stated that with the river so improved, under the July 11, 1900, permits, the current would be less than a mile and a quarter per hour (*infra*, p. 43). There was some controversy as to this in the hearings before Secretary of War Stimson, so much mentioned. The Secretary in his statement made January 8, 1913 (Appellant's Narrative, p. 28), did not find that a current in the Chicago River exceeding a mile and a quarter per hour, would be created by the 10,000 cubic seconds feet diversion through it, or that such diversion would be in any way obstructive or injurious to navigation thereon.

Appellee's Point IV-A.

(Its Brief, p. 192.)

We have heretofore pointed out that,

United States v. *Rio Grande Dam & Irrigation Company*, 174 U. S. 698,

does not support appellee's contention that the July 11, 1900, permits would not authorize any effect upon the navigable capacity of other waters than the Chicago River. In that case the Secretary of War had not granted a permit for the diversion of the waters of the Rio Grande River. The Court held that, had there been such a permit, the Irrigation Company's works would have been treated as lawful structures.

We have heretofore pointed out that the channels of the Chicago River and its branches were enlarged under the July 11, 1900, permits (*infra*, pp. 42 to 45) so that the diversion of 10,000 seconds feet could be withdrawn through them; that under the Illinois statute the amount of water required as the population of appellant increased, should be diverted from Lake Michigan just as surely as if there were no gates at Lockport by which the diversion could be controlled. This follows, because the Act of May 29, 1889, is mandatory as to

the amount of the diversion, and the trustees of appellant could be forced under that Act to comply with it. (*Infra*, p. 54.)

Counsel refer to the September 11, 1907, and July 30, 1910, permits for the construction of the North Shore Channel and the Calumet Sag Channel, respectively, as granting a privilege to appellant, with a condition that the diversion should not exceed 250,000 cubic feet per minute. The September 11, 1907, permit on this subject, contains the following provision as a condition to the diversion of water through the North Shore Channel at Wilmette and the Lake Shore (Appellant's Narrative, p. 82):

> "2. That the total diversion of water from Lake Michigan through the Chicago River into the Illinois River, shall be no greater than already authorized by past War Department permits."

The July 11, 1900, permits were at that time valid and subsisting. Appellant had been for a number of years previously and was then actually performing the work of deepening and widening the channels of the Chicago River and its branches, as authorized by those permits. Such deepening and widening would permit the withdrawal of the amount of water required by appellant's organic act according to the population of appellant. Necessarily, appellant assumed that the condition of the September 11, 1907, permit for the diversion from Lake Michigan at Wilmette, Illinois, through the North Shore Channel, referred to those permits and not to the December 5, 1901, order, the latter one being made purely because of the then restricted channels of the Chicago River and its branches. At that time no objection had ever been made to the proposed withdrawal of water through the Chicago River as required by appellant's works. It could not be assumed by appellant that the War Department or the Attorney General would seek to enforce the order of December 5, 1901, which had become a mere paper limitation because of the removal of the reason for its issuance.

Counsel also refer to the condition of the permit of June 30, 1910, as follows (Appellant's Narrative, p. 83):

> "(d) That the amount of water withdrawn from Lake Michigan through the Chicago and Calumet rivers together, shall not exceed the total amount of 250,000 cubic feet per minute (4,167 cubic feet per second) already authorized to be withdrawn through the Chicago River alone."

Appellant had then completed its North Shore Channel. The suit of March 23, 1908, had been instituted by the Attorney General (Calumet River suit), questioning *only* the diversion through the Calumet River and Calumet Sag Channel proposed by this adjunct to the Main Sanitary & Ship Canal and the diversion through the Chicago River. The work of deepening and widening the channels of the Chicago River and its branches, had not then been completed. Under the permits of July 11, 1900, appellant had been diverting (admittedly), for a number of years, water in excess of the limitation of 4,167 seconds feet as it was required by its organic act. It was necessarily assumed that it was the desire of the Secretary of War to maintain this paper limitation *only* until the deepening and widening of the channels of the Chicago River and its branches had been *entirely* completed under the July 11, 1900, permits, and that, of course, such limitation would be removed when the work was done. Furthermore, condition (f) of said June 30, 1910, permit (Appellant's Narrative, p. 84) expressly provided that it should not be used in litigation

> "to determine the right of the said Sanitary District to divert from Lake Michigan for sanitary purposes an amount of water in excess of that now being diverted, without having first obtained a permit from the Secretary of War."

We have not used this permit and are not basing any right upon it. The only purpose of referring to it, was to show that any facts and controversies with reference to the diver-

sion through the Calumet River and the Calumet Sag Channel, are not material in this litigation. We are willing to assume that it was the intention of this permit that the privilege granted should be conditioned upon appellant's being limited to a diversion from Lake Michigan from all sources equal to that which it was under the facts, circumstances and the law, entitled to withdraw through the channels of the Chicago River and its branches to the Sanitary & Ship Canal; and that it should not make any claim for a diversion by way of the Calumet River and the Calumet Sag Channel in addition to that which it is entitled to take through the Chicago River. We do not believe that our attitude on these important matters can be characterized as

> "the untenable position taken by appellant throughout its brief." (Appellee's brief, p. 194.)

Appellee's Point IV-B.

(Its Brief, p. 195.)

The very language of the case cited by appellee

(*United States* v. *Rio Grande Dam & Irrigation Company*, 174 U. S. 690.)

shows that this court would not uphold an injunction unless the works of the irrigation company would

> "*substantially diminish the navigability,*"

of the Rio Grande River. We are amused at the attempt of appellee's counsel to make the word "substantially" mean "appreciably." Webster's New International Dictionary, defines the adjective *substantial*—

> "1. Consisting of, pertaining to, of the nature of, or being, substance; material; as, *substantial* life.
>
> 2. Not seeming or imaginary; not illusive; real; true.
>
> 6. Considerable in amount, value, or the like; large, as, a *substantial* gain.
>
> 8. That is of moment; important; essential; material."

The same dictionary defines the adjective *appreciable*—

> "Capable of being appreciated or estimated; large or material enough to be estimated; perceptible; as, an *appreciable* quantity."

We have distinguished elsewhere in this brief

Economy Light & Power v. *U. S.*, 256 U. S. 113, (*infra* 49),

U. S. v. *Chandler-Dunbar Co.*, 229 U. S. 53, (*infra* 29), and the

Wheeling Bridge case, 13 Howard 553, (*infra* 54).

We apprehend that the conflicting interests of health, on one side, and commerce, on the other, as here, is just as important to be considered as the "conflicting interests of commerce over the bridge and under the bridge" (Appellee's Brief, p. 198).

In

Henning v. *Georgia*, 163 U. S. 299, 317,

this court gave such consideration to the conflicting interests of the state's public morals with interstate commerce, that it upheld a state statute against operating trains intrastate as well as interstate on Sunday. See also the many other cases cited by us, Point 4 (b). (Appellant's Brief, p. 165, *et seq.*)

Union Bridge Co. v. *United States*, 204 U. S. 364.

The cases of

New York v. *State of New Jersey*, 256 U. S. 296,

and

Kansas v. *Colorado*, 206 U. S. 46

were cited by us in support of the position which we believe to be correct—that appellee here must establish its right to an injunction more clearly than would be required of one of the states of the Union in a suit against another.

Appelee's Point IV–C.

(Its Brief, p. 201.)

In the

Wheeling Bridge case, 13 Howard 553,

cited by appellee, the question of finding whether the bridge there considered was an obstruction to navigation was determined by ascertaining the height of the smoke-stacks or other projections of boats navigating the Ohio River which would come in contact with the span of the bridge. The number of feet that the smoke-stack extended above the water level could be ascertained by measurement with an ordinary tape. The distance from the surface elevation of the water in the Ohio River under the Wheeling bridge to the span of the bridge could likewise be determined by the use of a tape. Then it was a mere question of taking the two measurements and comparing them to see whether a boat could pass under the bridge. Here, as we have pointed out in our original statement of the case (our Original brief, p. 63), there was a complicated process used by appellee's experts to reach conclusions as to a supposed lowering effect and damage to commerce upon the Great Lakes.

APPELLEE'S POINT V.

(Its Brief, p. 202.)

We are pleased to note that appellee does not "laugh off" our argument that appellant's diversion is authorized under the Act of Congress of March 2, 1827, by the remark that it is "childish" or "puerile." The *amici curiae* brief in support of appellee's position characterizes our argument as to the effect of this Act of Congress as follows (*Amici Curiae* Indiana, *et al.*, Brief, p. 30):

> "Appellant, by a most interesting, *if not convincing*, argument, attempts to connect its right to the abstraction of water from Lake Michigan with the provisions of the Act of March 2, 1827."
>
> (Italics ours.)

Counsel call a mere guess the statement of Mr. Wisner (Rec. Vol. VI, p. 3433), as to the minimum run-off of the Chicago River drainage area being less than the amount of water drawn from the West fork of the South branch of the Chicago River through the old Illinois-Michigan Canal, after the pumps were installed at its Northern terminus, in the year 1883, thus causing the reversal of the flow of said river and the taking of water directly from Lake Michigan. It appeared that Mr. Wisner had for twenty-five years prior to the time he testified been connected with the appellant in the Engineering Department. During a large portion of the time he was its Chief Engineer and was thoroughly familiar with the various things necessary to know in order to reach the conclusion stated (Rec. Vol. VI., p. 3433). We apprehend that the taking of water from the Chicago River through the Illinois-Michigan Canal to the Desplaines and Illinois Rivers is not logically different from the direct taking from Lake Michigan, because the natural flow of the Chicago River was into Lake Michigan. The taking of the water before it reached the lake

—which water would naturally go there—is, we believe, the same as taking it from the lake itself.

The findings of Secretary of War Stimson of January 8, 1913, are fully discussed in our original brief (p. 205).

Appellee's Point V-A.

(Its Brief, p. 203.)

The Act of Illinois (January 9, 1836), under which the old Illinois-Michigan Canal was built, specifically provided that the canal should be at least 45 feet wide, and there should be reserved 90 feet on each side for the purpose of enlargement (Appellant's Statement, Original Brief, p. 18). Appellee makes the statement (its brief p. 209)—

> "It is not claimed that appellant's canal is within this 90-foot zone. It could not be, for the new canal is 160 to 200 feet wide."

The fallacy of appellee's statement is shown by merely adding the 90 feet on each side—which makes a total of 180 feet—to the original width of the canal, 45 feet, which gives an area of 225 feet for the enlarged canal. *This is substantially the width of the present Sanitary and Ship Canal in the earth section and is greater than the width of the Sanitary and Ship Canal in the rock section.*

The Act of Congress of March 30, 1822, expressly provided that ninety feet should be reserved on each side of the canal to be built. (Appellant's Brief, p. 16.)

Appellee states (its brief, p. 210):

> "The Act of Congress authorized a canal, not two canals or a dozen."

It was incumbent upon the state to build a canal suitable for navigation in consideration of the grant of land. The state did not exhaust its power or discharge its obligation by building a canal which in 1848 suited the then requirements of navi-

gation. To say that it could not and was not required to thereafter—when commerce demanded a larger canal—either enlarge the old canal or abandon it and build another in its place, is not in keeping with the purpose sought to be accomplished by the legislation in question. The requirement by the January 9, 1836, Act of Illinois that 90 feet on each side of the canal should be reserved for enlargement, and the same requirement of the March 30, 1822 Act of which the March 2, 1827, Act was a mere reenactment, beyond question shows congressional as well as state intent that the canal to be then built should be enlarged as the public interest might require.

Counsel refer to Section 3 of an Act of the General Assembly of the State of Illinois of July 1, 1919, (Appellee's Brief, p. 210). It is obvious that the *only* purpose of this legislation was to preserve this canal for use as a "terminal and harbor" in connection with the Sanitary and Ship Canal. It was not designed to maintain it for the purpose of providing means whereby boats could pass from the West fork of the South branch of the Chicago River to Joliet. Another construction is not in keeping with the physical conditions as they existed at the time the 1919 Act of the General Assembly of Illinois was passed, for then there existed the Sanitary and Ship Canal connecting the West fork of the South branch of the Chicago River with the Illinois and Michigan Canal at Joliet, which was much deeper and wider than the old canal and was designed by the state for the increasing demands of commerce on this water route.

There is no question but that the General Assembly of Illinois, under the Act of May 29, 1889, granted full authority to appellant to build the Sanitary and Ship Canal as a link in the waterway to the Gulf of Mexico. As we have pointed out in our original brief (p. 31)), Section 17 of the said Act expressly gave authority to enter upon, use, widen and deepen any waterway, canal or lake belonging to the state. The joint

resolution of May 28, 1889, adopted by the General Assembly, (Our Original Brief, p. 21) expressly stated the waterway policy and the purpose to build through Illinois a deep waterway, using the Chicago diversion.

Appellee states that there was no express authority to discharge sewage under the Act of March 2, 1827, into the canal or other waterways. (Appellee's Brief, p. 212.) This was very thoroughly considered in

Missouri v. *Illinois*, 200 U. S. 496.

The waterway was constructed. Necessarily, the people of Chicago could use it for the discharge of sewage and wastes, the same as all the other waterways of the United States have been used. Congress had not occupied the field. It was just as lawful to use the waterway in this way as were any other acts of the states under their sovereign powers.

Concerning the amount of water diverted or to be diverted by appellant, appellee puts the following query (Appellee's Brief, p. 213.)

> "Does that mean that eventually appellant will be forced to take 25,000 c. f. s. under the Act of 1827?"

Such consideration is wholly aside from any facts presented here. Appellant is acting under the Illinois Act of May 29, 1889. This Act authorized it to lay out and construct a canal across the Continental Divide not less than 10,000 cubic seconds feet in capacity, for the purpose of reversing at all times the Chicago River and diverting from the water supply the drainage and sewage. Under this act, it laid out a canal in the rock section of capacity of 14,000 seconds feet, and has built its diversion works now for a diversion of 12,000 seconds feet. It is probable that it is limited by the condition of the June 30, 1910, permit for the reversal of the Calumet River and Sag Channel to 10,000 seconds feet, or the amount it is under the facts and the law entitled to divert through the channels of the Chicago River and its branches to the Sanitary and Ship Canal.

Appellant has planned so that it will not be necessary to protect the water supply to divert the full maximum run-off of the Calumet Drainage Area approximately 15,000 seconds feet, by so arranging its Calumet Sag Channel and the intercepting sewer system, that the sewage and wastes may be carried to a point on the Sag Channel so that they will not ever be carried back into Lake Michigan. This is accomplished by placing the necessary controlling works at the Northern terminus of the Sag Channel. The Calumet Drainage Area population is comparatively sparse, and the problem there is entirely different from the one which exists to provide an outlet for the drainage and sewage emptying into the channels of the Chicago River and its branches. Why this question should be raised, is beyond our comprehension. There is no suggestion made in the pleadings or in the brief that the State of Illinois abused its discretion in authorizing the Sanitary and Ship Canal to be constructed with its attendant diversion, as provided by the Act of May 29, 1889. In fact, we apprehend under the authorities cited in our original brief (p. 162), that any such contention would receive no consideration by this court.

Counsel (Appellee's Brief, p. 213), in referring to statement (our Original Brief, p. 122) that it was necessary to have 10,000 cubic seconds feet diversion from Lake Michigan for navigation purposes, as well as for the protection of the water supply, characterize our statement to be

"without foundation in the record or in fact."

The fallacy of appellee's said statement is demonstrated by the report of the International Waterways Commission on the Chicago Drainage Canal, January 4, 1907, (Appellant's Narrative, p. 511), as follows:

"15. Although the primary object of the Chicago Drainage Canal was the discharge of Chicago sewage, *its function as a channel for navigation was kept in view from the beginning.* All of the bridges over it are draw

bridges with ample openings. A provision of this kind, as well as the care exercised to make the sewage inoffensive by liberal dilution, was necessary to conciliate the interests in the valley of the DesPlaines and Illinois River, which would otherwise be adversely affected. *It can hardly be doubted that the canal will eventually form a part of an improved waterway between the Great Lakes and the Mississippi River*, though its full depth will probably not be required for that purpose. Congress has not adopted any scheme for this improvement, but by its direction a survey was made, and plans with estimates for a waterway 14 feet deep were submitted, by a board of engineers in a report dated August 26, 1905. The board found that for a distance of about 100 miles from Chicago the improvement must be with locks and dams, and as the quantity of water required would be merely that needed for the service of locks and other incidentals, the extent of the improvement of depth which could be obtained in that part of the route was without limit so far as it depended upon the amount of water available. *For the remaining distance, about 223 miles, the improvement would be an enlargement of the open channel and the degree to which it was practicable was entirely dependent upon the quantity of water flowing. The board assumed that the Chicago Drainage Canal would eventually be permitted to take 10,000 cubic feet per second from Lake Michigan, and it expressed the opinion that with that volume added to the natural low-water discharge of the Illinois River a depth of 14 feet in the open channel could be maintained;* also that if a much greater depth was to be secured a much larger volume of water *must be taken* from Lake Michigan."

Further, Mr. Lyman E. Cooley, a witness for defendant, whose evidence is undisputed in the record, on the same subject, makes the following statement (Appellant's Narrative, p. 298):

"Perhaps I may add in that connection that in the later consideration of the matter by the State after 1907, it is based on a flow of 14,000 second feet; and that the Deep Water Project is not practicable without the aid of the large water supply from Lake Michigan, which has been authorized by the State law.

Outside of that, we would be limited to eight or nine feet as the best that could be done.

These depths of fourteen feet were predicated by the original act and collateral legislation in 1889, and in all subsequent legislation, were based on a flow of 10,000 feet and the report of 1907 used that depth of fourteen feet as a preliminary depth, but states that with the aid of the 14,000 feet, it will be possible to continue twenty-four feet to the City of Peoria and twenty feet more or less from thence to the mouth of the river.

And I assume from the fact that the constitutional amendment was based on that report, that is the project. It is the one that has been advocated by the Lakes to the Gulf Deep Waterways Association, and the one that was presented to Congress in the hearings of 1910, before the House Committee and before the Senate Committee, and Congress made conditional appropriation of a million dollars for the beginning of work, whenever an understanding should be reached with the State of Illinois regarding a plan of co-operation."

Recently, Col. William V. Judson, for a number of years United States engineer at Chicago, who studied late waterway projects of the State of Illinois, in a report concerning the use of the diversion of water from Lake Michigan by appellant for waterway purposes, March 23, 1921, (H. R. Document No. 2, 67th Congress, 1st Session), said:

"For a 9-foot channel with an increment of 4167 second feet, the cost, either with dams retained or removed, appears almost prohibitive, and the probability that Congress will limit the increment to 4167 second feet is, in my opinion, so remote that this hypothesis may be left out of consideration. * * * In my opinion, to most reasonably conform to the probable conditions of the future, an 8-foot project should now be adopted, based on a 7500 second feet withdrawal for purposes of estimate, and with all dams removed. *Then should Congress place the limit of the amount of water to be withdrawn from Lake Michigan at* 10,000 *second feet, which I deem probable, and under proper conditions, advisable,* that increment would of itself increase the depth to 9 feet."

Counsel refer to the case

In re Boyer, 109 U. S. 629,

which case merely holds that admiralty has jurisdiction concerning the collision of two boats navigating the Illinois and

Michigan Canal. The crossing of this canal by the Calumet Sag Channel, was authorized by the Secretary of War permit of June 30, 1910. (Appellant's Narrative, p. 82.)

In building appellant's Sanitary and Ship Canal, appellant did not excavate in the Illinois and Michigan Canal. It built a large canal to replace the old canal, providing for the new canal a connection with the Upper Basin of the Illinois and Michigan Canal in the DesPlaines River. The new canal became a navigable water of Illinois and of the United States, all of which was agreeable to Federal and State policies. *Mortell* v. *Clark*, 272 Ill. 210, (Appellant's Brief, 119).

Here (Appellee's Brief, p. 215) appellee merely rehashes arguments made elsewhere and fully answered by us. (*Infra*, p. 29.)

Appellee's counsel refer to the statement in the report of appellant's president as to any limitation of the amount of diversion. Appellant's president, however, in that report (Appellee's Brief, p. 217) said:

> "I believe that we should have the volume requested for our needs as they appear and are justified."

We ask, can any one question the good faith and fairness of such a statement? This statement was made by an official representing the public, who had no purely private concern in the matter. The reference, counsel make to this statement, only shows the extremities to which they are driven for any argument.

We have heretofore mentioned appellant's witness Wisner's conclusions as to the minimum run-off of the Chicago River Drainage Area (Infra, p. 69). That river's drainage area run-off was stated by Mr. Wisner, and it is not disputed in this record. (Appellant's Narrative, p. 189.)

> "The drainage area of the Chicago River basin is about 307 square miles. The run-off of the Chicago River basin in a dry season is practically the city water supply, and some little ground water, but at times of maximum floods it will reach as high as 10,000 cubic feet per second."

Mr. Cooley also testified that the maximum run-off of the Chicago River Drainage Area was 10,000 cubic seconds feet (Appellant's Narrative, pp. 278, 279). In fact the determination of this maximum run off was one of the first steps taken by the Drainage & Water Supply Commission in planning this work. It is hardly fair to characterize the statements as guesses. They were the findings of witnesses competent to make them. There was no evidence offered by appellee in opposition. If there had been, appellant could have cumulated its evidence in this respect.

Appellee's suggestion that the State of Illinois has not delegated its authority under the Congressional Act of March 2, 1827, to appellant, is too frivolous to require answer.

Appellee's Point V-B.

Its Brief (p. 219)

The Act of June 29, 1906, entitled

> "An Act for the control and regulation of the waters of the Niagara River, for the preservation of Niagara Falls, and for other purposes,"

at this point in its brief, is specially discussed by appellee, and some remarkable claims are made. Counsel attempt to construe the Act to prohibit diversions from any of the Great Lakes in the United States for any purpose, domestic, sanitary or navigation, except by the consent of the Secretary of War. Realizing the insufficiency of Section 10 of the 1899 Act, to support their contentions, counsel seek *by construction* of the Niagara Falls Act to make it apply to the Chicago diversion. The mere fact that to support their position a construction of the Act is necessary under the authorities cited by us in our original brief (Point IV (b), pp. 165-173), furnishes the answer, as by counsel's own admission Congress has not by those plain and unmistakable expressions required, exercised its power over these diversions.

The Act only applies, as it is stated expressly in the first section, to

> "the diversion of water from Niagara River or its tributaries in the State of New York."

The committee report quoted by counsel (their Brief, p. 221) upon this very Act, expressly recited the conditions under which diversions had and did then exist for water power purposes from the Niagara River at Niagara Falls in the State of New York; that the diversions at that time were authorized only by acts of the State of New York. The Federal Government had not prior to that time assumed any jurisdiction; and the committee believed that the Federal Government should *then* exercise its authority. As the committee report states:

> "It is thought best by the Committee that the Federal authority should *now* be exercised * * *"

In another place in the report, it is stated:

> "It is, however, very desirable, if not essential, that legislation be *now* enacted to prevent the further depletion or diversion of the waters of the river, and to furnish a basis for diplomatic action".

This is a clear and definite statement that as to *diversions* even from boundary waters for *any purpose*, Congress had not seen fit to exercise its power; that the diversions up to that time had been treated as lawful, having *only* the authority of the State of New York. So, when Congress sought to exercise its powers over the subject of diversions, it confined itself to the diversions from the Niagara River, and specifically authorized the Secretary of War to grant certain permits. Section 2 prescribes the conditions under which the Secretary of War may grant permits for power diversions. His course of action in exercising this power, delegated to him, is definitely prescribed. Up to that time no authority had been granted to the Secretary of War to fix diversions or to interfere in any manner with the State's action as to diversions; other-

wise there would have been no occasion for the passage of the Niagara Falls Act. And when Congress assumed jurisdiction over diversions, it confined its regulation to the Niagara River or its tributaries, *in the State of New York*. All other diversions were excluded, not only impliedly, *but expressly*, and, impliedly and expressly, by said Act, they were left in the same condition they were before the Niagara Falls Act was passed, namely, the authority of the State, in which the diversion was authorized, was left supreme and unhindered by Congressional Act or Federal regulation.

The proviso of Section 1 relates to the first part of the Section, namely,

> "that the diversion of water from Niagara River or its tributaries in the State of New York, is hereby prohibited, except with the consent of the Secretary of War, as hereinafter authorized in Section 2 of this Act".

The proviso applies to the whole of the first clause of Section 1, and when the words are used in the proviso,—

> "That this prohibition shall not be interpreted as forbidding the diversion of the water of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation,"—

Congress did expressly say that the Niagara Falls Act should not only not apply to the Great Lakes, but not even to the Niagara River, as to diversions for sanitary, domestic or navigation purposes. When the words were used following the ones last quoted of the proviso,—

> "the amount of which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States, under its direction",—

it merely expressed the condition which existed anyway, that Congress might in the future specially exercise jurisdiction to regulate diversions for those particular purposes. It had not theretofore done so. We cited and discussed this Niagara Falls Act (our Original Brief, Point IV (C), p. 179) to show that Congress at the time it was passed, expressed itself to

the effect that it did not consider it had prior to that time assumed to regulate diversions or to authorize the Secretary of War to regulate them for domestic or sanitary purposes. We also in our original brief (p. 53, 180) referred to the debate in the Senate when that body was considering the conferees' report on the Niagara Falls Act, and to the very pertinent and illuminating statement of the late Senator Lodge—

> **"The first section of the bill protects the right of Chicago."**

Counsel refer to the case of

Cummings v. *Chicago,* 188 U. S. 410,

and assume to quote from the opinion in that case (Appellee's Brief, p. 223), which does not support their contention as to a negative pregnant. The quotation is not from the opinion of this Court in

Cummings v. *Chicago, supra,*

but is from the opinion in

Lake Shore, Michigan Southern Railroad Company v. *Ohio,* 165 U. S. 365, 368,

wherein it was claimed that Section 7 of the 1890 Act delegated to the Secretary of War exclusive authority as to the authorization for the construction of bridges over streams wholly within the state. The particular clause of Section 7 of the 1890 Act under consideration in that case, is the one in the proviso after the word "provided", in the last part of said section, as follows:

> "Provided, That this section shall not apply to any bridge, bridge-draw, bridge piers, and abutments the construction of which has been heretofore duly authorized by law, or be so construed as to authorize the construction of any bridge, draw-bridge, bridge piers, and abutments, or other works, under an act of the legislature of any state, over or in any stream, port, roadstead, haven, or harbor, or other navigable water *not wholly within the limit of such state*".

The Court merely held in *Lake Shore, Michigan Southern Railroad Company Case, supra,* that the words

"not wholly within the limit of the state",

showed that as to waters *wholly* within the limits of the State, the State's authority was not curbed; that, still, as to bridges over such waters, the State could authorize their construction.

Referring to the proviso of Section 1 of the Niagara Falls Act, it must follow that as to waters diverted for sanitary, domestic or navigation purposes from the Great Lakes or from the Niagara River, the States' authority still existed under their reserved powers.

The only limitation was that Congress might thereafter assume jurisdiction over diversions for such purposes, or direct the Secretary of War to take action regarding them.

Counsel again refer to

United States v. *Rio Grande Dam & Irrigation Company,* 174 U. S. 690,

and suggest that we reread that case. We find no reference in that case to diversions for either sanitary, domestic or navigation purposes. Furthermore, the use of the water of the Rio Grande River was not provided for under any reserved power of a state, but only under legislation of a territory — New Mexico. **Furthermore, the Denver and Rio Grande Dam & Irrigation Works had not been either under construction or in operation for upwards of a third of a century under such circumstances that Congress was not only directly advised, but because of the magnitude, must be presumed to have known of their existence, whereby it should be concluded that their construction and operation were treated by Congress as lawful and proper, at least until it should interpose itself to specifically and specially regulate it.**

Appellee's Point V–C.

(Its Brief, p. 226)

Counsel quibbles (its brief, p. 226) over our statement that that International Waterways Commission, by its January 4, 1907, report regarding the Drainage Canal, recommended that the Chicago diversion should be allowed to the extent of at least 10,000 cubic seconds feet of water; whereas appellee's counsel say the report recommended that the diversion should not exceed 10,000 cubic seconds feet, or that the Government should prohibit the diversion of more than that amount. We fail to see any real distinction in view of the fact that the amount of diversion in controversy here is 10,000 cubic seconds feet.

It was perfectly reasonable that the International Waterways Commission, upon whose recommendations the terms of the Treaty of 1909 were fixed, should treat the diversion of 10,000 cubic seconds feet as an existing diversion. The capacity of the canal was at least 10,000 cubic seconds feet. The works of appellant, including the deepening and widening of the channels of the Chicago River and its branches for 10,000 cubic seconds feet diversion, had been substantially completed. It remained only for the population to increase, as it has done, so that the legal ratio of dilution would require shortly the full 10,000 cubic seconds feet. As we pointed out in our original brief (p. 190), the International Waterways Commission, in its January 4, 1907, report, in speaking of the Chicago Drainage Canal diversion, said:

> "Nor does it wish to re-open the case of the Chicago Drainage Canal as designed and built. *It accepts that as a fixed fact, with its attendant diversion of* 10,000 *cubic feet per second through the* Chicago River". (Appellant's Narrative, p. 522.)

NOTE: The quotation in our original brief is incorrect, in that the words "in the bill" should be as above quoted—"and built".

The above report was on the subject of the Chicago Drainage Canal. Reference to earlier reports of the International Waterways Commission upon the subject of the diversion of the waters of the Niagara River, at Niagara Falls, for power purposes between the United States and Canada indicates that the United States was charged with the full 10,000 cubic seconds feet diversion at Chicago in determining the amount that should be allowed to Canada and to the United States. The Canadian section of the International Waterways Commission, April 25, 1906, made a report on this subject, a portion of which is as follows: (Appellant's Narrative, p. 103)

"If our proposal is carried out the diversion will be about as follows:

Diversion on the American Side Per Second Cubic Feet	
Niagara Falls	18,500
Chicago Drainage Canal	10,000
Total	28,500
Diversion on the Canadian Side	
Niagara Falls and on the Niagara Peninsula	36,000"

* * *

"The diversion by the Chicago drainage canal should be limited to the use of not more than 10,000 cubic feet per second. * * * This would give an apparent advantage to Canadian interests, but as the diversion is not of serious injury to the Falls and does not materially affect the interests of navigation, it is more than counter-balanced by the complete diversion of 10,000 cubic feet by way of the Chicago drainage canal to the Mississippi River."

On May 3, 1906, the International Waterways Commission made a report signed by both the Canadian and American members, in part as follows: (Appellant's Narrative, p. 104):

"The Commission has made a thorough investigation of conditions existing at Niagara Falls and the two sections have presented reports to their respective govern-

ments setting forth these conditions, to which attention is invited. The following views and recommendations are based upon a careful study of the facts and conditions set forth in these reports * * *"

* * *

"3. The Commission, therefore, recommends that such diversions, inclusive of water required for domestic use or the service of locks in navigation canals, be limited on the Canadian side to 36,000 cubic feet per second, and on the United States side to 18,500 cubic feet per second (and in addition thereto, a diversion for sanitary purposes, not to exceed 10,000 cubic feet per second, be authorized for the Chicago drainage canal), and that a treaty or legislation be had limiting these diversions to the quantities mentioned."

The report of January 4, 1907, of the International Waterways Commission, on the Chicago Drainage Canal, only related to whether the two countries should agree to a diversion in excess of 10,000 cubic seconds feet of water, which amount the previous report of the Commission, as above stated, had recommended and had treated as an existing diversion, as appears by the following statement of said report: (Appellant's Narrative, p. 514):

"20. It was not generally known until after publication in March last of the report of the American section of this commission upon Niagara Falls that an amount greater than 10,000 cubic feet per second would be asked for. In that report, subsequently concurred in by the Canadian section, it was recommended that the diversion of 10,000 cubic feet be allowed. The preservation of Niagara Falls alone was considered, and that in the light of the tacit agreement above described. It was supposed at the time that this was all that Chicago needed, but the recommendation gave offense to the officials of the sanitary district, and the further demand then came out in the form of appeals to the committees of Congress and to the Secretary of State. It is necessary now to take up the question anew, and, after considering it in all its bearings, to reach some conclusion as to whether there should be a limit to the amount of water to be diverted at Chicago, and, if so, as to what that limit is."

Again the Commission stated, in its report (Appellant's Narrative, p. 522), as follows:

> "The extension of the system (diversion) to the Calumet River, alone, is in question".

Further, the said report stated (Appellant's Narative, p. 528):

> "The preservation of the levels of the Great Lakes is imperative. The interest of navigation in these waters is paramount, subject only to the right of use for domestic purposes in which term is included necessary sanitary purposes. In our report of November 15, 1906, upon the application of the Minnesota Canal & Power Co. to divert certain water in Minnesota, we recommended, among other things 'that any treaty which may be entered into should define the uses to which international waters may be put by either country without the necessity of adjustment in each instance, and would respectfully suggest that such uses should be declared to be (*a*) uses for necessary domestic and sanitary purposes; (*b*) service of locks for navigation purposes; (*c*) the right to navigate.' It is our opinion that so far as international action is concerned a treaty provision of that kind is all that is required in this case. We accordingly renew our recommendation of November 15, 1906, just quoted."

It is apparent from the foregoing quotations from the International Waterways Commission reports, which formed the basis of the treaty, that both of the high contracting parties agreed to the diversion of 10,000 cubic seconds feet of water from Lake Michigan at Chicago, and that it was treated as an existing diversion. **The right to divert that amount from Lake Michigan, was not, at the time the treaty was made, in dispute.** The only dispute was as to the right to withdraw an additional 4,000 cubic seconds feet through the Calumet River and the Calumet Sag Channel. Therefore, Article 2 of the Treaty, providing for suits to be instituted by citizens for damages, and the right of either one of the high contracting parties to object in case of injury to navigation, could

only apply, so far as the Chicago diversion was concerned, to any diversion in excess of the 10,000 cubic seconds feet. Article 2 expressly, as pointed out by us in our original brief, reserved the right to the United States and to the respective state governments, to deal as they should see fit with non-boundary waters like Lake Michigan (as to uses of water thus in dispute) subject only to the said limitations as to suit and objection for injury to navigation. 10,000 cubic seconds feet diversion was not in dispute.

Article 3 of the Treaty expressly provides that it should not interfere with the uses of boundary waters for domestic and sanitary purposes. Article 8, states the order of precedence, and makes the use for domestic and sanitary purposes paramount or first. Our object in referring to those clauses in our original brief, as is obvious, was to show that even as to boundary waters, diversions for domestic and sanitary purposes should not be disturbed; and also, to give further support to the express words of Article II, reserving full rights in the United States and respective state governments, as to diversions from non-boundary waters.

It will be observed in the quotations from the International Waterways Commission report of May 3, 1906 (infra, p. 84), and the report of January 4, 1907, (infra, p. 84), that they treated the Chicago diversion as being one for ordinary sanitary purposes. Counsel suggests that other cities about the Great Lakes might do the same thing, thus, as they say, entirely draining the lakes, and that Chicago is the only city which diverts water for this purpose and therefore it cannot be treated as a diversion for ordinary sanitary purposes. On the other hand, it is obvious that it is an ordinary diversion, because it was the only way Chicago could protect its water supply. The other cities about the Great Lakes are not so situated that they, or any of them, could take advantage of this best way of providing pure drinking water.

Mr. Lyman E. Cooley, in his testimony on the subject of the Chicago diversion, which evidence is undisputed in this record, stated (Appellant's Narrative, p. 311):

"Chicago is the only city situated about the Great Lakes in which sewage disposal can be made through the back lots, and in which even storm waters for long distances along the lake shore may be absolutely excluded from the lake itself, the source of water supply. The pass that we have to cut down to divert our waters to the southwestward is only 7 to 8 feet as measured by the rock floor at Lemont above the low water of 1847; and only 2 to 3 feet above the high water of 1838, so that a channel can be cut in that direction at a minimum cost.

On the other hand, the lowest divide to the east between the waters of the lakes and the Ohio River is the Wabash-Maumee Divide at Ft. Wayne, which is about 190 feet above Lake Erie. And on the north is the Fox-Wisconsin Divide at Portage, Wisconsin, between the Fox River that empties into Green Bay and the Wisconsin River which empties into the Mississippi River, and this divide is 210 feet above the lake. So it is not possible at any other point about the Great Lakes to make a solution at all similar to that which has been provided at Chicago.

It is one of the endowments of our site, and it is the reason we are here, and it is the reason that the city is here; and from my point of view we are entitled to avail ourselves of it like any other bounty of nature, and to utilize the lakes in that connection.

From a conservation standpoint we utilize the lakes in that connection for all the utilities that can be worked out of it. It is perhaps the highest conservation to which waters have ever been put in the world."

APPELLEE'S POINT VI.

(Its Brief, p. 236.)

Appellee, under Point VI discusses the effect of the various permits. We concede, only for the sake of argument, the proposition suggested in the first paragraph of appellee's brief under this point (Appellee's Brief, p. 236).

Appellee's Point VI-A.

(Its Brief, p. 236.)

We fail to see the purpose of the quotation from Major Marshall's report of June 24, 1896 (Appellee's Brief, p. 237). Major Marshall suggested there were certain questions to come up later—among them, whether the diversion would be allowed by the United States and Great Britain. The treaty of January 11, 1909, reserved to the State of Illinois the right to divert water from Lake Michigan for sanitary purposes. Congress has treated the diversion as lawful, in that it has not seen fit to regulate diversions for these purposes. The right to divert the amount claimed by appellant has been authorized not only by the permits of July 11, 1900, but by the one of May 8, 1899.

Appellee's Point VI-B.

(Its Brief, p. 238.)

We pointed out in our original brief that the recital (May 8, 1899 permit),—that the Chicago River had been improved at the time the permit was granted for a withdrawal through it of 300,000 cubic feet per minute—, did not limit the granting clause of the permit, which *granting clause* contained no words of limitation. We cited *Corrigan Transit Co. et al.* v. *Sanitary District of Chicago,* 137 Fed. 851, which held that

the recital and the preambles of the permit in no way modify the granting clause.

Counsel say (Appellee's Brief, p. 241) that the December 5, 1901, order was accepted by appellant "in lieu of previous permits" and referred to the condition of said order stating that the permit was "subject to such modification as the public interest may from time to time require." How this December 5, 1901, order could be in lieu of the May 8, 1899, permit, it is difficult to conceive. The order was made under Condition 2 of the 1899 permit, which related solely and only to modification in the event a current should prove unreasonably obstructive to navigation on the Chicago River. The Secretary of War could not enlarge that condition by using words in a conditional clause in the order, which order was made expressly, and could only spring from Condition 2 of the original permit.

Appellee's Point VI-C.

(Its Brief, p. 241.)

July 11, 1900, permits.—Here again counsel fail to take into consideration the long expressed purpose of appellant in enlarging the channels of the Chicago River and its branches. The ordinance of April 21, 1891, of appellant's Board of Trustees expressed its purpose concerning these river channels. The applications for the July 11, 1900 permits recited the plan of widening of the river channels to 200 feet and their corresponding deepening. Such excavations of the river channels were designed to, and the result would, enlarge the cross sections of the river channels for a flow of 10,000 cubic seconds feet through them limited to a current of less than a mile and a quarter an hour prescribed by the Secretary of War. It was part of the plan adopted by the Board of Trustees under the ordinance of April 21, 1891, to make these river channels the supply channels for the Sanitary and Ship Canal, with its capacity of 10,000 cubic seconds feet of water. This

plan was expressed by said ordinance (April 21, 1891—appellant's original brief, p. 34). The first application for permit to carry out this program was made June 16, 1896, in which it was stated (Appellant's original brief, p. 36):

> "The work of the Sanitary District has progressed so far that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey Street, Chicago, to Lockport in Will County, twenty-eight miles distant.
>
> Our connection with Lake Michigan must be through the Chicago River, with the West Fork and the South Branch of which we make a junction at Robey Street."

The excavation under these July 11, 1900, permits was in furtherance of the original plan. This work accomplished the purpose of appellant for its required diversion. General Bixby so found in his report of 1906 on the Chicago Drainage Canal (infra, p. 61). Secretary of War Stimson in his January 8, 1913, statement did not find that a current was or would be created in the Chicago River, obstructive to navigation, with a diversion of 10,000 cubic seconds feet through the enlarged channel of the Chicago River and its branches. The permits of July 11, 1900, were subject to the same conditions as the May 8, 1899, permit. After the work under the July 11, 1900 permits was done the Secretary of War has never found, or objected to the diversion of 10,000 cubic seconds feet through the channels of the Chicago River and its branches to the Sanitary and Ship Canal on the ground, that a current was, or would be, created injurious to navigation on said river.

Appellee's Point VI-D.

(Its Brief, p. 243.)

The effect of the September 11, 1907, permit as to the North Shore Channel, and the June 30, 1910, permit as to the Calumet Sag Channel, has been discussed by us elsewhere (infra, pp. 64. 65).

Appellee's Point VI–E.

(Its Brief, p. 243.)

Counsel cites *Southern Pacific* v. *Olympian Dredging Co.*, 260 U. S. 205, which has been discussed by us elsewhere (infra, p. 49).

APPELLEE'S POINT VII.

(Its Brief, p. 244.)

Counsel curiously quote a part of a sentence from our brief (p. 152), as indicating that we concede that Congress may occupy the field so far as diversions by states for sanitary and domestic purposes are concerned, to the exclusion of any exercise of power by the state. Our position is that that question is not now before this Court, as is indicated by the sentence immediately following the one partly quoted by appellee. The states' acts are lawful until Congress occupies the field, which it may do at any time. It cannot be deemed to have occupied the field unless it has clearly expressed such intention.

Appellee's Point VII-A.

(Its Brief, p. 247.)

Counsel cite *Henderson* v. *Mayor of New York*, 92 U. S. 183, but do not state the true facts of that case. In *Miln* v. *City of New York*, 11 Peters 103, this Court held valid Section 1 of the Statute of New York, providing that the Master, within twenty-four hours after arrival, should report to the Mayor the name, place of birth, last legal residence, age and occupation of every person brought as a passenger. In the *Passenger cases*, 7 Howard 283, the Court held a Statute of New York placing a tax of a certain amount upon each passenger coming into the port to be invalid as a direct tax or burden upon interstate commerce

In

Henderson v. *Mayor of New York, supra,*

the statute of New York in question required the Master to give a bond of a certain amount for each passenger, and upon failure to give bond, to pay a certain amount for each

passenger coming into port on his vessel. Failure to give bond or make payment incurred a penalty of $500 for each default, which was made a lien upon the vessel. The Court held that the real purpose of the statute was to collect the $1.50 per passenger and that it was, therefore, void, as a direct tax or burden upon interstate commerce. *Miln* v. *New York, supra,* was merely distinguished. It was not overruled.

Kansas City S. R. Co. v. *Kaw Valley Drainage,* 233 U. S. 75,

held invalid an order of the state court directing the absolute removal of a bridge over which interstate commerce was carried. These cases have no application to the propositions here.

Appellee's Point VII-B.

(Its Brief, p. 249.)

Counsel quote from *Morgan* v. *Louisiana Board of Health,* 118 U. S. 455. We paraphrase part of their quotation to suit the facts in this case as follows:

> "But it may be conceded that whenever Congress shall undertake to provide for the commercial cities of the United States a general system *prescribing the use and diversion of navigable waters of the United States for public health (of quarantine)*, or shall confide the execution of the details of such a system to a national board of health, or to local boards, as may be found expedient, all state laws on the subject would be abrogated, at least so far as the two are inconsistent."

NOTE: We replace the words in parentheses by the words in italics in paraphrasing the quotation to emphasize its application to this case.

Counsel neglected to add the very pertinent last sentence of the paragraph quoted, as follows:

> **"But until this is done, the laws of the State on the subject are valid."**

The second reason given by this Court, for its said holding, is stated as follows (p. 465):

> "But, aside from this, quarantine laws belong to that class of state legislation which, whether passed with in-

tent to regulate commerce or not, must be admitted to have that effect, and which are valid until displaced or contravened by some legislation of Congress.

The matter is one in which the rules that should govern it may in many respects be different in different localities, and for that reason be better understood and more wisely established by the local authorities. The practice which should control a quarantine station on the Mississippi River, a hundred miles from the sea, may be widely and wisely different from that which is best for the Harbor of New York. In this respect the case falls within the principle which governed the cases of *Wilson* v. *Blackbird Creek Marsh Co.*, 2 Pet. 245 * * *." (Many more like cases were cited)

So, here the question of the proper way to provide a pure water supply for Chicago and thereby protect the public health may be best handled by the local authorities. The use of the navigable waters of the United States for that purpose, in the way most suitable for the interests of the locality, should be determined by the local authorities. The proper solution of the problem in one locality may be entirely different and may require entirely different application of principles to the solution in another locality. We have in the United States cities located where the temperatures are extreme. In other parts, there is practically no change. In some localities the people are engaged entirely in industrial pursuits—such as manufacturing; in others, agriculture or the raising of fruits are the principal activities. The ideals and desires of the people of different localities are not alike. The people of some localities demand that greater care should be taken in the protection of health and in the removal of odors or things offensive to the eye. The people or their representatives in local self-government in each of these localities can best determine how their purely local affairs in the interest of public health shall be administered. It is the purpose of Congress to permit the activities of the local governments to continue as exercised by them under the police power for public welfare, but always with the reservation

that Congress may, when it finds the occasion necessary, intervene. Until it does, the local regulations are valid. An excellent example is the Congressional Act for the preservation of Niagara Falls of June 29, 1906, under which Congress stepped in to regulate diversions from the Niagara River. These diversions, based solely upon the laws of the State of New York, **even for power purposes from an international stream, injuring navigation not only on the Niagara River but on Lake Erie, outside of the State of New York, were considered lawful and valid.** And these diversions for power purposes from this international stream were created and continued during the pendency not only of the Act of September 19, 1890, but also that of March 3, 1899. Yet, no action was taken by the Attorney General or appellee to enjoin those diversions. These corporations diverting water to make electricity to sell for profit were treated as law-abiding citizens. On the other hand, appellant, a public municipal corporation, sustained by public taxation, is considered and called a culprit, acting beyond the pale of the law.

Appellant's justification, not only under the direct Act of Congress of March 2, 1827, but further under the permits of the Secretary of War, acting under Section 7 of the 1890 Act and Section 10 of the 1899 Act, and under the law of overruling necessity, Congress not having regulated the subject, is called baseless, and likened to the apology of a child.

The case of

Mobile County, etc. v. *Kimball*, 102 U. S. 691,

related to an improvement by the state of the River, Bay and Harbor of Mobile under an act of the legislature of Alabama, and the language of the case is applicable only to that situation.

We have heretofore pointed out the necessity of the diversion of 10,000 cubic seconds feet for navigation purposes as well as for the protection of Chicago's drinking water supply (infra, p. 72). Counsel assert that no one of our cases

cited under Point IV.-B is in point (Appellee's brief, p. 252). In support of this statement they say:

> "*New York* v. *Miln*, 11 Peters 102, was overruled in *Henderson* v. *Mayor of New York*, 92 U. S. 183; 23 Law Ed. 543."

New York v. *Miln, supra*, on the contrary, was reaffirmed in *Henderson* v. *Mayor of New York, supra*, and the latter case was distinguished from the *Miln case*, as we have pointed out (infra, p. 92) because the purpose of the section of the statute under consideration in *Henderson* v. *Mayor of New York* was a direct tax upon the passengers or the boat carrying the passengers of so much per passenger. It was held to be a direct tax or burden upon interstate commerce. The requirement of the statute under consideration in *New York* v. *Miln*—that the master should give the names and other information as to each passenger on his boat—was held to be a proper regulation under the police power of the state.

Our Point IV.-B (Appellant's original brief, p. 163) is that Congress did not intend that the Secretary of War could regulate the diversion of water from Lake Michigan and thus frustrate acts of the state pursuant to police power. In order that the act should be so construed, it was necessary that such Congressional intention should appear plainly and in unmistakable terms.

Under Point IV.-C of our original brief (p. 176), we showed that, as to this particular diversion, Congress, by other acts, had indicated that it was not its intention that the Chicago diversion for sanitary purposes should be limited.

We do not quarrel with the quotation from *Wilkerson* v. *Rahrer*, 140 U. S. 545, as appellant's diversion "does not belong to commerce." (Appellee's Brief, p. 253.)

In

Wisconsin v. *Duluth*, 96 U. S. 375,

the Court had under consideration acts of Congress specially relating to the Duluth Harbor and the canal across the Saint Louis River to Superior Bay in Wisconsin.

APPELLANT'S POINT VIII.

(Its Brief, p. 255.)

Appellee asserts various facts, some sixteen in number, to establish no acquiescence or estoppel on the part of appellee. We will take them up in order.

(1) Appellant's work was instituted prior to September 19, 1890. (Infra, p. 27.)

(2) Appellee's officers co-operated with appellant in building its canal and in providing for the diversion to the amount of water claimed by appellant it has a right to withdraw from Lake Michigan. (Appellant's Statement of the Case, its brief, pp. 18 to 29, 34 to 41, *Infra*, pp. 104 to 110.)

There was no suggestion that congressional action was required, but merely that Congress might exercise its power under the commerce clause of the Constitution to regulate the diversion. Until that was done, under the law, appellant's acts were lawful and legal. There was no pretense that executive officers might attempt or had the power to hinder or limit appellant in the operation of its diversion works as proposed.

(3) This point is answered under (2), *supra.*

(4) The engineer's report of August 16, 1895, referred to by appellee, related to the subject of lake levels. When the permits were later given, not only for the enlargement of the Chicago River to physically make possible the diversion, but also for the channels opening, under the permit of May 8, 1899, they did not contain any condition as to the effect of the diversion upon surface elevations of the lakes. If there was any injury to lake levels, it was waived.

(5) By the Treaty of 1909, Great Britain has consented to the 10,000 cubic seconds feet diversion. In any event, it can not object.

Congress has not acted to modify the diversion, which is one of the conditions of the permits. The action here is only by executive officers to limit the diversion.

(6) The permits only recited as a condition the paramount authority of Congress, not "of the Federal Government" acting through executive officers.

(7) The Act of 1899 was not retroactive. It was only prospective. Structures built, lawful under previous conditions, were not made illegal.

(8) Again, it was the paramount authority of Congress that was recognized under the application for the permit of May 8, 1899, and in the permit itself; not that of the Federal Government, stirred into action by executive officers.

(9) The May 8, 1899, permit was attempted to be modified by the Secretary of War, acting solely under Condition 2 of the permit relating to current in the Chicago River. Obviously, when appellant had created the cross sections of the Chicago River and its branches to remove any necessity for limitation of flow, as there was no current affecting navigation, the orders limiting the withdrawal ceased to have effect, or the Secretary had no power in the matter.

(10) The effect of the September 11, 1907, permit and the condition thereof, has been fully discussed by us elsewhere. (Infra, p. 64.)

(11) Appellee's counsel are quite free in their interpretation of the prayer of the bill of the Calumet River suit. They say (Appellee's brief, p. 259):

> "The prayer of the bill was for an injunction restraining appellant from reversing the flow of the river and from withdrawing from Lake Michigan any water except as authorized by the Department of War (the amount of water thus authorized being then 4,167 cubic seconds feet)."

The bill in that case relates only to the withdrawal through the Calumet River and Calumet Sag Channel. The prayer

likewise covers that and nothing else. Note the following express words of the prayer which eliminated the Chicago River (Rec., Vol. VIII, p. 6):

> "and from doing or attempting anything in any way to reverse the flow of the said Calumet Rivers, and from doing or attempting anything in any way to divert or abstract any waters from Lake Michigan in any channel *other than the Chicago River as already authorized by said Secretary of War,* unless *prior to beginning any of said work* or doing or attempting to do any of such things, *the Chief of Engineers of the United States shall have recommended, and the Secretary of War of the United States shall have authorized, the doing of such work.* * * *"

At the time this bill was filed, March 23, 1908, the permits of July 11, 1900, were in existence, valid, had never been revoked. The work recommended by the Chief of Engineers and authorized by the Secretary of War had been commenced, was then proceeding, and appellant was expending vast sums in performing it. The prayer of the bill itself expressly eliminated from any question the diversion through the Chicago River and its channels resultant from *work recommended by the Chief of Engineers and authorized by the Secretary of War.* And this bill was filed by the Attorney General under the same authority, Section 12 of the 1899 Act, that the bill in the main channel suit instituted October 6, 1913, is sought to be sustained. A plainer recognition of appellant's right to divert the 10,000 cubic seconds feet through the channels of the Chicago River and its branches to the Sanitary and Ship Canal, and of our position in respect to it, it would be difficult for appellant itself to make to order.

(12) Appellee has set forth here the average yearly flow of water through the Sanitary and Ship Canal, beginning in the year 1900, and ending with the year 1913. Some point is attempted to be made of a passing remark in the report of the International Waterways Commission of January 8, 1910, to the effect that it had asked for the records of withdrawal,

and had been refused by appellant. We know of no issue raised in this record that appellant had refused to give information to appellee as to the amount of its withdrawal. Such refusal to this one commission might have been made by some clerk or officer of the appellant and without the sanction of its board of trustees or its president. There is no place in the record where there is an assertion made by appellee that it did not know of the amount of the average yearly diversion during all this period. Immediately preceding the very statement made by the International Waterways Commission as to the refusal of appellant to furnish it the records, is the further observation that it was not material to the matters under consideration by the Commission, and that the Commission believed the diversion to be greater than 4,167 cubic feet per second. The report stated (Rec., Vol. VII, p. 253):

> "The flow through the canal since June, 1904, has been assumed to be 4,167 cubic feet per second, the quantity authorized in the permit of the Secretary of War. It is believed to have been greater, but the difference is not sufficient to vitiate the results sought for here."

Had the Commission considered appellant's records material for its investigation, an application to the President of appellant's Board of Trustees, or to the Board itself, would undoubtedly have obtained the desired records of flow. They were public officers, not personally interested.

Furthermore, Mr. Isham Randolph, the chief engineer of appellant from the time of the opening of its Sanitary and Ship Canal to 1907, and Mr. George M. Wisner, appellant's chief engineer from that time until about the year 1920, both testified as to the volume of flow through the Chicago River, and the Sanitary and Ship Canal, and the circumstances thereof. No question was asked of them by appellee as to whether the records of flow had ever been refused appellee, or any one else.

(13) The effect of the Calumet Sag permit of June 30, 1910, has been elsewhere considered. (Infra, p. 65.)

(14) The effect of the application of Secretary of War Stimson's refusal of May 8, 1910, to remove the limitation of December 5, 1901, and formally authorize the diversion of 10,000 cubic seconds feet, has been fully considered by us under Point VIII of our argument. (Our original brief, p. 205.)

(15) The works for the diversion of 10,000 cubic seconds feet through the Chicago River and its branches to the Sanitary and Ship Canal, had been substantially completed when the application of February 5, 1912, and the refusal of January 8, 1913, by Secretary of War Stimson, were made, and the Main Channel suit—October 6, 1913—was commenced.

(16) The record does not disclose any delays caused by appellant in the final disposition of this case, and *there were none.*

Appellee again cites the *Wheeling Bridge case,* 13 Howard 553, which has been fully discussed and distinguished by us. (Infra, p. 54.)

In

Monongahela Navigation Co. v. *United States,* 148 U. S. 312,

this Court held that the United States should pay the Navigation Company compensation for the destruction of the canal built by it pursuant to legislation of the State of Pennsylvania and the invitation of the United States. In summing up the facts, this Court said (p. 334):

> "But in this case there was not only the full authority of the state of Pennsylvania, but also so far as respects this particular lock and dam they were constructed at the *instance* and *implied invitation* of *Congress.* The Act of March 3, 1881, making an appropriation for the improvement of the rivers, in terms provided that no such improvement should be made until the Navigation Com-

pany had in good faith started upon the building of this lock and dam. *This lock and dam connected* the *lower* improvements *already* made by the Navigation Company with the *upper improvements proposed* to be made by Congress, and the appropriation by the latter was conditioned on the company's undertaking their construction. This is something more than the mere recognition of an existing fact; it is an *invitation* to the company to *do* the *work;* and *when* in *pursuance* of that *invitation*, and under *authority* given by the state of *Pennsylvania*, the company has *constructed* the lock and dam, it does *not lie* in the power of the state or the *United States* to *say* that *such* lock and dam are an *obstruction* and *wrongfully* there, or that the right to compensation for the use of this improvement by the public does not belong to its owner, the Navigation Company."

What were the Acts of Congress and of the officers of the United States that constituted the invitation to the Monongahela Navigation Co.? On March 3, 1881, Congress, by an act, appropriated $25,000 for improving the Monongahela River in West Virginia and Pennsylvania, provided that (p. 315):

"* * * this sum shall not be expended until the Monongahela Navigation Company shall have undertaken in good faith the building of lock and dam number seven at Jacob's creek, and until said company shall, in manner satisfactory to the Secretary of War, give assurance of their ability and purpose to complete the same."

Thereafter, on March 24, 1881, the United States engineer officer in that district wrote the Navigation Company reciting the Congressional Act mentioned, asking that the Navigation Company proceed in good faith to build the lock and dam.

We have heretofore shown (*infra*, pp. 104 to 110) Appellant's Statement, Original Brief, pp. 18-22, 48-59) the invitation extended by various acts of Congress in making surveys and requiring reports, and by the reports themselves, to construct the link in this waterway from Lake Michigan across the continental divide to the Desplaines River.

In addition, by Congressional Acts in providing for the improvement of the Chicago River, Congress invited the co-operation of appellant in deepening and widening the channels of the South Branch and the West Fork to conform to the Government's plan and project for the improvement of navigation on the Chicago River and its branches. It is admitted by the pleadings (Appellant's Narrative, pp. 18, 39) that $4,216,066.36 was expended by the United States in the improvement of the Chicago River and Harbor, and that $1,626,539.20 of said amount was expended on the Chicago River proper. This latter amount was expended from 1896 to 1913. The facts, which are undisputed in this record, as to the Government's work on the Chicago River and the South branch covering the period from 1896 to 1913, are stated by the witness George M. Wisner (Appellant's Narrative, pp. 184-186):

"The Government did not expend any money in connection with the improvement of the Chicago River until 1896.

Since 1896 the United States expended, up to say June 30, 1913, in the improvement of the Chicago River itself approximately $1,626,000.

It was expended for dredging the North and the South Branches to a depth of 17 feet on the first project, and later the deepening of the North Branch as far north as Belmont avenue, I think, to a depth of 20 feet.

The Government also bought some land on both branches of the river for the purpose of constructing what is known as turning basins. These are basins that are large enough so that vessels can turn around and come back down the river bow first. The one on the North Branch is at Diversey boulevard, and the one on the South Branch is at the junction of the West Fork and the South Branch, just east of Ashland Avenue. Part of this money on the original project was expended for widening the Chicago River at some of the narrowest and most dangerous places. Part of this money was expended deepening the main branch of the river to a depth of 20 feet from the mouth to the junction of the

two branches. Generally this covers the money that was expended by the Government for the improvement of the river.

The City of Chicago has expended in the improvement of the Chicago River approximately $6,275,000.

From about 1861 to the present time, approximately to this time it was expended for dredging of the Chicago River, both the main river and on all its branches, building of bridges and docks, and general improvements.

These improvements in the Chicago River were done by the United States Government during the time that the Sanitary District was completing its works—particularly the South Branch. The deepening of the North Branch has been done in quite recent years; that is deepening the North Branch to 20 feet.

Since the 17 foot project of the United States Government it has done no work on the South Branch, although it has deepened the North Branch to 20 feet. *The Sanitary District took up its work and did this dredging.* When the Sanitary District started on this project, the Government had not quite completed the dredging to 17 feet. It was widening the river at certain places where it was narrow, that is the South Branch. *Some of this work of the Government and the Sanitary District was carried on simultaneously. The widening done by the Government however was at a few places, and did not amount to very much.*

The Sanitary District commenced its work on the improvement of the Chicago River along about 1896."

Let us now examine the Congressional Acts concerning the Chicago River improvement in cooperation with and inviting the appellant to deepen and widen the South Branch of the Chicago River and the West Fork of the South Branch.

The first item looking to the improvement of the Chicago River appears in the Rivers and Harbors Bill of July 13, 1892, (Vol. 1, Laws, Improvement of Rivers and Harbors, p. 611; United States Stat. at L. Vol. 27, p. 88,) as follows (619):

"Improving harbor at Chicago, Illinois: Completing improvement, seventy-two thousand dollars; and the en-

gineer in charge of the harbor is directed, in his next report, to submit what, if any, improvement should be made by the Government in Chicago River, and the cost of same."

The Rivers and Harbors Act of August 18, 1894, (Vol. 1, Laws, Improvement of Rivers and Harbors, p. 677; United States Stat. at L. Vol. 28, p. 338,) contains the following item (685):

> "Improving harbor at Chicago, Illinois: Completing improvement, eighty thousand dollars; and the Secretary of War may, in his discretion, use twenty-five thousand dollars of this sum in the improvement of Chicago River up to the forks of said river."

The Rivers and Harbors Act of June 3, 1896, (Vol. 1, Laws Improvement of Rivers and Harbors, p. 743; United States Stat. at L. Vol. 29, p. 202), contained the following (781):

> "For improving the Chicago River, in Illinois, from its mouth to the stock yards on the South Branch and to Belmont Avenue on the North Branch, as far as may be permitted by existing docks and wharves, to be dredged to admit passage by vessels drawing sixteen feet of water, according to the recommendation of Captain W. L. Marshall, of the Corps of Engineers of the United States Army, in his report under date of August ninth, eighteen hundred and ninety-three."

It is important now to examine the report of Captain Marshall of August 9, 1893, especially mentioned in said Act. This report mentioned the Sanitary and Ship Canal then under construction, as follows (Appellant's Narrative, p. 457):

> "To remedy the, at times, insupportable and disgusting condition of the river and its branches; to purify the river and to preserve the city water, relief is now sought under state laws by constructing a drainage canal from the south branch of Chicago River to the Desplaines River above Joliet, capable of discharging into the Illinois River Valley from three hundred thousand to six hundred thousand cubic feet of water per minute.
>
> * * *

This channel has been located from the south branch of the Chicago River to Lockport, and is under construction, but no provision has yet been made for channels of supply from Lake Michigan. Whatever the outcome or plans of the local officials having this work in charge may be, it can be said that the Chicago River and its branches cannot in their present condition, supply materially more than from one-third to one-half of the minimum requirements of the law, without producing currents that will be prohibitory to navigation at some of the bridges and obstructions now existing.

It is certainly evident, granting the proposition that effective channels for the purpose will be constructed, that if this method of solving the drainage problem is to be carried to conclusion, there must be a complete remodeling of Chicago River throughout both its branches, and there must be also artificial channels of large capacity to furnish even approximately effective outfalls to the sewerage systems of a great city founded on low lands extending some twenty-two miles long, and for miles back from the lake, as well as other large feeders connecting the lake with such channels."

The importance of some time improving these rivers to provide a depth of twenty to twenty-one feet was mentioned; also the removal of the docks and bends in widening the river. The tunnels under the river necessary to be removed were mentioned (Appellant's Narrative, pp. 458-460). The report also stated that it would be necessary to rebuild bridges over the river and to consider the extension of navigation from the Illinois River to Lake Michigan (Appellant's Narrative, pp. 460, 461). The report recommended that immediately the Chicago River from its mouth to the stock yards on the South Branch and to Belmont Avenue on the North Branch should be improved and dredged to admit passage by vessels drawing sixteen feet of water, and that encroachments by persons building docks into the river and that obstructive bridges should be limited. This recommendation only covered the immediate necessities. The greater development for twenty and twenty-one feet by the removal of tunnels

and the dredging and widening of the Chicago River and its branches was definitely contemplated and *suggested* by the report.

The Rivers and Harbors Act of February 26, 1897, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 807; United States Stat. at L. Vol. 29, p. 597), contained the following item (813):

> "Improving Chicago River, Illinois: For continuing improvement from its mouth to the stock yards on the South Branch and to Belmont Avenue on the North Branch, one hundred and thirteen thousand dollars, in pursuance of the provisions of 'An Act making appropriations for the construction, repair, and improvement of certain public works on rivers and harbors, and for other purposes,' approved June third, eighteen hundred and ninety-six; and it is hereby declared to be the true intent and meaning of the said provisions of said Act relating to the improvement of said Chicago River that all of the work in the improvement of said river which *was recommended or suggested* to be done in the interest of commerce by Captain William L. Marshall, of the Corps of Engineers of the United States Army, in his report of August ninth, eighteen hundred and ninety-three, may be done."

The Rivers and Harbors Act of July 1, 1898, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 827; United States Stat. at L. Vol. 30, p. 597), contained the following (830):

> "Improving Chicago River, Illinois: For continuing improvement from its mouth to the stock yards on the South Branch, and to Belmont Avenue on the North Branch, four hundred thousand dollars."

The Rivers and Harbors Act of March 3, 1899, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 843; United States Stat. at L. Vol. 30, p. 1121), contained the following item (895):

> "Improving Chicago River, in Illinois: Survey and estimate of cost *for a channel twenty-one feet deep* from its mouth to the *stock yards on the South Branch*, and to Belmont Avenue, on the North Branch, so far as may be

permitted by existing docks and wharves, exclusive of cost of removing or constructing bridges or piers or lowering tunnels; and the aforesaid *depth of twenty-one feet is hereby adopted as the project depth for the improvement in lieu of that fixed by the Act of June third, eighteen hundred and ninety-six:* Provided That all the work of removing and reconstructing bridges and piers and lowering tunnels necessary to permit a practicable channel with said depth to be obtained shall be done, or caused to be done, by the City of Chicago without expense to the United States."

It will be recalled that this very item of said Rivers and Harbors Act was under consideration by this Court in

Chicago Street Ry. Co. v. *Chicago,* 201 U. S. 505,

wherein the Court held that Congress itself had given assent to the removal of the tunnels and the Secretary of War's authority was unnecessary. This included the reconstruction of bridges therein mentioned. It would apply, also, necessarily to the work of appellant of deepening and widening the South Branch and the West Fork of the South Branch of the Chicago River to conform to the project adopted by Congress. However, the consent of the Secretary of War for this work was in every respect obtained.

The Rivers and Harbors Act of June 6, 1900, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 926; United States Stat. at L. Vol. 31, p. 588), contained the following item (927):

"Improving Chicago River, Illinois: For continuing improvement from its mouth to the stock yards on the South Branch, and to Belmont Avenue on the North Branch, sixty-two thousand dollars."

The Rivers and Harbors Act of June 13, 1902, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 949; United States Stat. at L. Vol. 32, p. 331), contained the following item (994):

"Improving the Chicago River, Illinois: Continuing improvement, three hundred and six thousand four hundred and fifty-seven dollars."

The Rivers and Harbors Act of March 3, 1905, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 1080; United States Stat. at L. Vol. 33, p. 1117), as to a survey, contained the following item (1127):

> "West Fork of the South Branch of the Chicago River, with a view to securing a twenty-one foot channel."

The Rivers and Harbors Act of March 2, 1907, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 1220; United States Stat. at L. Vol. 34, p. 1073), contained the following item (1259):

> "Improving Chicago River, Illinois: Continuing improvement and for maintenance, three hundred thousand dollars."

The Rivers and Harbors Act of June 25, 1910, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 1381; United States Stat. at L. Vol. 36, p. 630), contained the following item (1417):

> "Improving Chicago River, Illinois: Continuing improvement and for maintenance, one hundred and seventy-five thousand dollars."

The Rivers and Harbors Act of February 27, 1911, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 1460; United States Stat. at L. Vol. 36, p. 933), contained the following item (1479):

> "Improving Chicago River, Illinois: For maintenance, thirty-four thousand dollars."

The Rivers and Harbors Act of July 25, 1912, (Vol. 2, Laws, Improvement of Rivers and Harbors, p. 1521; United States Stat. at L. Vol. 37, p. 201), contained the following item (1567):

> "Improving Chicago River, Illinois: For continuing improvement, $28,000."

The Rivers and Harbors Act of March 4, 1913, Vol. 2, Laws, Improvement of Rivers and Harbors, p. 1574; United States Stat. at L. Vol. 37, p. 739, contained the following item (1596):

"Improving Chicago River, Illinois: For maintenance, $10,000."

The Rivers and Harbors Acts of August 1, 1914, (U. S. Stat. at L. Vol. 38, p. 636), July 27, 1916, (U. S. Stat. at L. Vol. 39, p. 401), August 8, 1917, (U. S. Stat. at L. Vol. 40, p. 258), and March 2, 1919, (U S. Stat. at L. Vol. 40, p. 1283), all contained small items making appropriations for the maintenance of the Chicago River.

It will be noted that after the year 1912, no appropriation was made for the further enlargement of the Chicago River, its North Branch, South Branch and West Fork, as at that time the 1920 and 1921 foot project had been completed. **The United States had done its work as provided by the project of Congress in the Chicago River proper and in the North Branch. Appellant had enlarged the South Branch and the West Fork according to the same project of Congress, which enlargement of said South Branch and West Fork was connected with and was a part of appellee's improvement of the Chicago River proper and of the North Branch. The appropriations thereafter were for maintenance only.**

The foregoing demonstrates not only an invitation to appellant to make the improvements in the South Branch and West Fork of the Chicago River to carry out the project of Congress for the improvement of those rivers to 20 and 21 foot depth, removal of tunnels, reconstruction of bridges, but also the actual cooperation of appellee through Congress with appellant, as appellant was doing its work of enlarging the channels of these rivers. The work done by appellant in deepening and widening the South Branch and West Fork, according to the project adopted by Congress, connected with, and was a part of, the work done by appellee in deepening

and widening the Chicago River proper and the North Branch. The invitation of appellee to appellant to carry out the work necessary for the diversion of 10,000 cubic seconds feet of water from Lake Michigan, is much stronger than that mentioned in

Monongahela Navigation Company v. *United States, supra.*

Appellee's Point VIII-A.

(Its Brief, p. 263.)

The authorities cited here do not apply, for appellant did not induce, by act or representation, appellee to acquiesce in the construction of the works for the diversion.

Appellee's Point VIII-B.

(Its Brief, p. 267.)

In

Union Bridge Company v. *United States,* 204 U. S. 364,

cited by appellee, there was express authority given the Secretary of War under Section 18 of the Rivers and Harbors Act of 1899 to require the alteration of bridges theretofore constructed.

Here again appellee fails to observe that there has been no congressional action revoking the rights of appellant as existed in the case of

United States v. *Chandler Dunbar Company,* 229 U. S. 51.

Appellee knew at all times that appellant was proposing to divert at least 10,000 cubic seconds feet of water through the channels of the Chicago River and its branches to the Sanitary and Ship Canal; that it was constructing its works

for that purpose, and was deepening and widening the river channels in order that its purpose might be physically accomplished.

Appellee's Point VIII–C.

(Its Brief, p. 270.)

Counsel bases its argument upon a false premise, namely, that there has been a revocation. Congress has done nothing. The United States is moved here solely by the action of executive officers. The Secretary of War has, not even, attempted any revocation of appellant's rights.

Appellee was not misled. Appellee knew for what purpose appellant was enlarging the channels of the Chicago River and its branches. It knew that one of the purposes of the construction by appellant of its works with the attendant diversion of water from Lake Michigan, was the disposal of sewage and drainage so that it would not reach Chicago's water supply. The Secretary of War granted the permits, with the understanding, which is the law, that Congress might thereafter regulate the entire situation, at which time only would the appellant's diversion works be subject to Federal regulation.

Counsel say, (Appellee's Brief, p. 282) that the fixing of the reference plane for the improvement of the channels of the Great Lakes six inches lower is unimportant. We called attention to this to show that Congress itself, in fixing this reference plane for the improvement of these channels, accepted the Chicago diversion and sought to offset for any effect upon the lakes' surfaces that it was claimed would take place. We are unable to see how the action of executive officers can set at naught this plain congressional acquiescence.

APPELLEE'S POINT IX.

(Its Brief, p. 283.)

Appellee's counsel having now consumed 282 printed pages in, as they believe, establishing their right in this court for an affirmance of the decree below, without, however, meeting categorically a single argument of appellant, and believing that it is now the time to deliver the last and fatal solar plexus blow, and deprive appellant of its last heart throb, assert that the injunction should be *effective immediately* and *without condition;* and that appellant be at once forever *restrained, without condition,* from diverting more than 4,167 cubic seconds feet from Lake Michigan.

This position is sought to be maintained in face of the admitted facts in this record, that the immediate limitation of the diversion as prescribed by the injunction, would cause pollution of Chicago's drinking water supply, resulting in the rage of typhoid fever and other water born diseases, public nuisances in the Chicago River, Sanitary and Ship Canal, Des Plaines and Illinois Rivers, creation of diseases along those rivers, destruction of fish life in the Illinois River and generally havoc in this community. A guess, as to the extent of the damage to result from the limitation of the diversion as stated, is beyond the power of a human being to hazard.

Appellee's Point IX-A.

(Its Brief, p. 284.)

Counsel for appellee discuss the right of the Attorney General to institute suit for an injunction, and thus the jurisdiction of the court. The question of jurisdiction of a Federal court, may be at any time raised, and the court will do so of its own motion.

Osborn v. *Bank of U. S.*, 9 Wheaton 738.

Wayman v. *Southard*, 10 Wheaton 1.
United States v. *Moore*, 3 Cranch 159.
Wilson v. *Mason*, 1 Cranch 45.
Mansfield C. & L. M. R. Co. v. *Swan*, 111 U. S. 379.
Bors v. *Preston*, 111 U. S. 252.
Morris v. *Gilmer*, 129 U. S. 315.
Pepper v. *Fordyce*, 119 U. S. 468.
Union Iron Bridge & Mfg. Co. v. *Otoe County*, 120 U. S. 225.
Mississippi & Run River Boom Co. v. *Patterson*, 98 U. S. 403.

Jurisdiction cannot be conferred by consent of the parties. There is no consent here.

The Secretary of War, in the June 30, 1910, permit as to the Calumet Sag Channel, may have called the Calumet River suit filed March 23, 1908, a friendly suit. We have not discovered a condition of this kind at any point in this litigation. Furthermore, the Calumet River suit has ceased to be of any particular concern to anyone, in view of the later Main Channel suit of October 6, 1913, involving all diversions through the channels of the Chicago River and its branches to the Sanitary & Ship Canal, and, also, through the Calumet River and the Calumet Sag Channel.

The statement by counsel of the facts and holding of this court in

Economy Light & Power Company, 256 U. S. 113, (Appellee's Brief, p. 285),

furnishes its distinction. There the suit was to remove a part of a structure, which is expressly provided for under Section 12 of the Act of 1899. Necessarily, if the court had obtained jurisdiction by proper action to remove a structure or a part of a structure, as specifically provided by the said section of said act, then the decree could be made effective

by enjoining the defendant from thereafter constructing the same or a like structure.

U. S. v. *Rio Grande Dam & Irrigation Company, supra,*

is not an authority in support of appellee's contention for in that case the action was brought under the express provision of Section 10 of the 1890 Act authorizing the Secretary of War to institute a suit for injunction to enjoin the **creation** of an **obstruction.** That case had been instituted prior to the passage of the Act of March 3, 1899. In fact it was first argued in this court in November, 1898, and decided May 22, 1899. In withdrawing from the Attorney General the broad powers which entitled the Attorney General to institute the Rio Grande Dam & Irrigation Company suit, Congress expressed an intention that the Attorney General should not thereafter exercise such broad powers. Thus it restricted the Attorney General's powers under the new act of 1899, and, evidently, expected the penal clauses of the statute to be a sufficient safeguard.

We do not believe that the statement by appellee's counsel (Appellee's Brief, p. 290), that the provisions of Section 12 of the 1899 Act did not supersede and repeal similar provisions of Section 10 of the 1890 Act, is seriously presented.

Counsel again cite the

Wheeling Bridge case, 13 Howard 553, (Appellee's Brief, p. 292).

How that case can be treated as having any application on the question whether the Attorney General has authority to institute this suit cannot be determined by us. That suit was instituted by the sovereign State of Pennsylvania, under the express provision of the Constitution giving this court jurisdiction as to controversies between the states.

In re Debs, 158 U. S. 564,

cited and quoted at length by appellee (Appellee's Brief, p. 293-297) related to the protection of the property of the

United States and the carrying of the mails. Furthermore, there were no statutory provisions prescribing what the Attorney General might do, as there is here.

Appellee's Point IX-B.

(Its Brief, p. 297.)

Comparative Injury.

It must be borne in mind that the sole legal proposition asserted in this case by appellee, is that, appellant, having been found here, without the affirmative authorization of the Secretary of War for a diversion of 10,000 cubic seconds feet of water from Lake Michigan, the injunction must issue as a matter of course. In what manner this authorization failed, is entirely immaterial, on appellee's theory. Of course, as we have pointed out extensively in our original brief herein and in this reply brief, that authorization was obtained. Appellee's counsel assert that it is unnecessary for appellee to show or even allege, material alteration or modification of the navigable waters of the United States or material injury to navigation; that all that is required, is that there is an alteration or modification of such navigable waters. To what extent, is beside the question. The case relied upon so much by them (*United States* v. *Rio Grande Dam & Irrigation Company*, 174 U. S. p. 690), does not uphold their contention, for there this court sent the case back for further evidence to determine whether the injury to navigation by the construction and operation of the dam, would be unreasonable.

Counsel fail, we believe, to appreciate that the powers exercised by the State of Illinois for the construction and operation of appellant's works, are just as necessary for the maintenance and preservation of the union, as those powers exercised by Congress under the commerce laws of the Constitution. This Court will reconcile the actions of the two sovereignties.

As has been so admirably stated by The Solicitor General in his valuable work entitled "The Constitution of the United States," recently published, this court is in the nature of a continuation of the constitutional convention. It is a tribunal where the great questions, involving the interpretation of the Constitution in its application to the states, may be individually settled. In many instances the exercise by the state of its police power in some manner and to some extent affects the exercise of Federal power. A very excellent example is the construction of bridges over navigable streams. It is necessary for the welfare of the state that these navigable waters shall be bridged. Yet they do obstruct navigation.

In the case of

Escanaba Transportation Company v. *Chicago*, 107 U. S. 678,

an ordinance of Chicago, closing bridges certain hours of the day, was upheld; yet interstate commerce was affected. The comparative injury that would result to the commerce of the United States and the injury to the City of Chicago and State of Illinois by not closing the bridges at those hours, was necessarily an important question to be considered in that case. And Congress has not in any way sought to regulate diversions of or the use of navigable waters for sanitary purposes and in the interest of public health.

Counsel are asking this court to uphold the mere fiat of a bureau of the Federal Government, which bureau has as its head the Chief of Engineers of the United States Army, because the Chief of Engineers failed to recommend in 1912 the removal of the limitation of the diversion of December 5, 1901, and thereupon the authorization of a diversion of at least 10,000 cubic seconds feet of water through the channels of the Chicago River and its branches to the Sanitary and Ship Canal. And this request of appellee's counsel is in the face of the admitted facts—colossal damage to appellant.

Appellee's Point IX-C.

(Its Brief, p. 302.)

Appellant, by making the offer contained in its motion of July 12, 1920, in connection with the settlement of the decree, was merely seeking to compose a controversy. It is not going to carry its corporate entity to the St. Clair or Niagara or St. Lawrence Rivers and build compensating or regulating works there, but proposes merely to pay a sum of money which shall equal the cost of constructing and maintaining such works, in order to compromise a lawsuit. What we ask the court to do, is to say to appellee:

> "You cannot have your injunction to the full extent you ask, when appellant offers to do a thing which will, in every way under the admitted facts in this case, make you entirely whole."

And it must also be remembered that Congress may, thereafter, interpose itself in this matter, if the solution proposed is not to its liking.

Counsel (Appellee's Brief, p. 304) discuss the Treaty of January 11, 1909, and assert that the remedial works cannot be constructed without the consent of the Joint Commission, and quote Article 4 of the Treaty. The very clause of that article quoted, provides that neither government shall construct remedial works on its own side of the boundary which shall have the effect of raising the *natural* levels of the water on the other side. If appellee's contention is correct, that this diversion reduces the levels below their natural levels, and the only purpose of the remedial works is to place the levels in the same condition as if the diversion did not exist, then there would be no raising of

> "the natural levels of waters on the other side of the boundary."

But whether it is necessary to obtain the consent of the Joint Commission or anyone else, is immaterial for the ad-

mitted facts in this case are that the effect of the Chicago diversion may be entirely compensated for by the construction of these remedial works. Therefore, if consent is refused, it would be for no good or valid reason, and appellant should not be, in that event, unnecessarily injured by the absence of such consent.

Counsel say (Appellee's Brief, p. 305) that the decree which appellant proposes could not be enforced. We apprehend no difficulty in the settlement of a decree which would make it a condition that appellant pay to the United States such an amount as the Secretary of War or some officer or tribunal of the United States, should determine the cost of the remedial works to be when they were properly authorized by Congress, or by such other authority as would be necessary. The diversion of the full 10,000 cubic seconds feet would be subject to those conditions.

Appellee's Point IX-D.

(Its Brief, p. 310.)

Again, notwithstanding the matter stated by appellee, in its conclusion to its brief (p. 316), it requests that the injunction be immediately made effective. Counsel again refer to a motion to strike certain portions of appellant's answer. The record does not disclose that any such motion was ever presented to the lower court. Notice that a motion would be entered was given February 28, 1914, (Rec. Vol. 8, p. 126), but no motion was ever filed and no order was ever entered passing upon any such motion.

The facts in support of our contention in this respect, as to the postponement of the time the injunction should be made effective, are undisputed in this record.

There is no suggestion by us that this court in any manner by sustaining appellant's position would take anything from

Congress, as counsel asserts (Appellee's Brief, p. 313). Congress still has the right, if it chooses, as it has had the right for over a third of a century since these works have been under construction or in operation, to regulate them and the amount of diversion, if appellant's action is not in keeping with its wishes.

APPELLEE'S CONCLUSION.

(Its Brief p. 316.)

The conclusion of appellee's brief makes a most remarkable suggestion; namely, that the Court, notwithstanding the admitted equities of this case in appellant's favor, confirm the lower court's decree as it now exists without prejudice to the Chief of Engineer's recommending, and the Secretary of War's granting authority for, the diversion from Lake Michigan required by appellant, until Congress may at either this coming session of the present Congress, or at the next Congress, exercise its power to regulate the Chicago diversion under the Commerce Clause of the Constitution. Counsel suggest that this Court disregard the fundamental principle of constitutional law,—that until Congress acts, the state's exercise of its reserved power is lawful. Appellee's counsel thus would make the rule,—that the state's exercise of the reserved power is lawful, *only for a limited time,* namely, the end of the next Congress. What would happen if Congress did not act within the time mentioned, counsel do not disclose. We presume, according to counsel's suggestion, the decree would then be effective without *any condition.*

This concession of the law officers of the United States is no more than the concession which the Secretary of War and the Chief of Engineers were prepared to make, when Judge Landis gave his opinion herein, at which time a memorandum from the Chief of Engineers, approved by the Secretary of War, was submitted to the Trustees of The Sanitary District, dated July 21, 1920. This appears from the letter of Col. Wm. V. Judson, of May 24, 1921, to the Chief of Engineers (Appellant's Narrative, p. 351):

> "14. In regard to the contention of the Sanitary District that it is necessary to divert more than 4,167 cubic feet per second in order to avoid contamination of

the City water supply and consequent epidemics, I was empowered in a memorandum of the Secretary of War for the Chief Engineers dated July 21, 1920, to say **'that if Judge Landis' decree is accepted as final, the War Department will issue no permit, since it is without legal power to do so, but will ask no further orders from the Court to enforce the limitation so long as the City of Chicago proceeds with dispatch to prepare plans and put them into process of execution for its sewage system. If the City of Chicago then prepares plans and consents to the War Department having current knowledge of its activity, either by reports to the courts or otherwise, the situation will be under the control of Judge Landis until the whole problem is disposed of. If, however, the City of Chicago proposes to appeal the case and takes no steps pending the appeal to cure the trouble, Colonel Judson should be instructed to make no concessions or promises of any kind.'** This memorandum of the Secretary of War was obtained through the Chief of Engineers at my solicitation for use whenever Judge Landis decides to finish the hearing on Attorney Adcock's arguments for allowing a total diversion of 10,000 second feet. In this connection Mr. Adcock was making the argument that the War Department would be arbitrary in acting on the findings of the court, and a statement was desired which would show that the Secretary of War would not be arbitrary in the matter. * * *

A second conference was held on February 7, 1921, at which the United States Attorney was represented by his assistant, Mr. J. B. Boddie. The proposal of the Secretary of War as embraced in the last paragraph of his memorandum of July 21, 1920 (E. D. 98093/657), was discussed and the Sanitary Trustees stated that they were unable to accept the proposition that Judge Landis' decree be accepted as final. On the other hand they stated that they would proceed diligently in the preparation and execution of plans for the treatment of sewage within the Sanitary District."

Obviously, the corporate officers of appellant could not, in the manner suggested, give away, through this proposed bargain, the fundamental rights of the people of this community.

We respectfully submit that the willingness to make these concessions demonstrates that the real basis for this litigation is not the injury alleged to result from appellant's diversion, but rather the desire to place in the hands of the Chief of Engineers of the U. S. A., this extraordinary power claimed for his in Appellee's Brief.

Undoubtedly counsel was moved to make this suggestion as to affirmance of the decree without prejudice to the Chief of Engineer's and Secretary of War's action, because of lack of faith in their position taken under Point IX (that the decree should be effective *immediately* and *without condition*). They are forced to admit that this Court could not, in justice and in keeping with its precedents, fail to do that justice to appellant which the facts warrant; that the enforcement of the lower court's decree without granting the necessary reasonable time to appellant and other municipalities within its territory, to readjust themselves to the condition of the limitation of diversion to 4,167 seconds feet, would be unjust, inhuman and not in accordance with equitable principles; that the time stated by appellant and the other municipalities that would be required to make changes, (*uncontradicted by the record*), is reasonable and proper. But notwithstanding their institution of these suits and their selection of the forum, appellee's counsel suggest that in some other place than this court, sitting as a court of equity, that justice, to which appellant is entitled, may be obtained.

In order that this great community may be relieved of an intolerable situation pending Congressional action, the Chief of Engineers would first be required to recommend the granting of authority by the Secretary of War, and thereafter the Secretary of War, on such recommendation, would be required to authorize the diversion. The Chief of Engineers may or may not recommend, and after his recommendation, the Secretary of War may or may not authorize the diversion. There are no prescribed rules or regulations under

which the Chief of Engineers or the Secretary of War shall act. These officers may refuse to act for any reason or reasons that to them seem justifiable, whether the reasons are sound, or are without any foundation.

In this connection we call attention to the very pertinent language in

Willamette Iron Bridge Co. v. *Hatch*, 125 U. S. 1, 16,

referring to this Court's decree in the *Wheeling Bridge case*, 13 Howard 518, permitting time in which to change the bridge, and, in speaking of the claim of Virginia, that it could do with the Ohio River as it chose within its boundary, this Court said (page 16):

> "This plea, therefore, presented not only a great question of international law, but whether rights secured to the people of the United States by compact made before the Constitution, were held at the mercy or caprice of every or any of the States to which the river was a boundary. The decision of the court denied this right. The plea being insufficient as a defense, of course the complainant was entitled to a decree prostrating the bridge, which had been erected *pendente lite*. But to mitigate the apparent hardship of such a decree, if executed unconditionally, the court, in the exercise of a merciful discretion, granted a stay of execution on condition that the bridge should be raised to a certain height, or have a draw put in it which would permit boats to pass at all stages of the navigation."

Appellee attempts to distinguish the action of the Court in the *Wheeling Bridge case* from appellant's suggestion that time be permitted for readjustment, by stating that, in the *Wheeling Bridge case*, Pennsylvania was suing only as a private litigant and there was no question of enforcement of paramount authority. Our examination of the facts of the *Wheeling Bridge case* does not disclose grounds for the distinction sought, as the *Wheeling Bridge case* turned principally upon the compact between Virginia and Kentucky, confirmed by Congress. This compact was treated as con-

gressional legislation defining the character of the Ohio River as a navigable stream, and of the bridge, violating this Act of Congress, Pennsylvania could complain. Counsel further fail to give consideration to the cases cited by us in our original brief (page 185),—*that the United States cannot expect the courts of its own creation to give in its behalf more favorable consideration than they would show to other litigants.*

Counsel in their brief (page 320) assert that it was not necessary to call upon a court of equity to enforce the supposed limitation of the Secretary of War of December 5, 1901, and counsel do not state, but we presume they mean, the army might have been called upon to proceed to the site of this diversion and take possession of appellant's works, and take such action as would be necessary to limit that diversion to 4,167 seconds feet. We doubt whether counsel are serious in this statement, in view of the provisions of Section 12 of the Rivers and Harbors Act of March 3, 1899, specifying what may be done in the event structures are placed in navigable waters without the authority of the Secretary of War. There are two remedies—namely, (1) as to structures—a suit for an injunction; and (2) as to structures and obstructions—penal action. No other remedies are provided, and there are none. How the army could be called into action counsel do not enlighten us. We know of no Act of Congress authorizing any officer of the United States to take such action.

CONCLUSION.

Counsel's claims for the affirmance of the decree below are based upon the contention that the appellant is without the authority of the Secretary of War for this diversion; that it is a condition precedent to the appellant's right to divert this water that it have this authorization. They have not met our argument that the Rivers and Harbors Act of March 3, 1899, does not in those plain and unmistakable terms required indicate the intention of Congress to exercise jurisdiction over diversions of water at Chicago, or the use and diversion of water for sanitary purposes. Our argument remains unassailed, that, assuming the Act of March 3, 1899, delegates to the Secretary of War authority to regulate diversions, he has not, in the clear manner required, limited the diversion to the amount fixed by the District Court's decree, because of the conflict between the December 5, 1901, supposed limitation and the permits of July 11, 1900, for the enlargement of the Chicago River. In referring to this diversion, this Court, in

Missouri v. *Illinois*, 200 U. S. 496, 519,

said:

> "In the case at bar, whether Congress could act or not, **there is no suggestion that it has forbidden the action of Illinois.**"

The supposed limitation of the diversion by the order of December 5, 1901, the basis of the Attorney General's suit here, is a mere shadow. This court will not give force and effect to such action of an administrative officer, as it stated in

Interstate Commerce Commission v. *Illinois Central R. R. Co.*, 215 U. S. 452, 470—

> "Beyond controversy, in determining whether an order of the Commission shall be suspended or set aside,

> we must consider * * * and (c) a proposition which we state independently, although in its essence it may be contained in the previous one, viz., whether, even although the order be in form within the delegated power, nevertheless it must be treated as not embraced therein, because the exertion of authority which is questioned has been manifested in such an unreasonable manner as to cause it, in truth, to be within the elementary rule that the substance, and not the shadow, determines the validity of the exercise of the power."

Appellant's diversion required by state law is authorized under the March 2, 1827 Act. The Secretary of War has actually granted the permission (May 8, 1899) which appellee's counsel claim was required. The conditions of this permit have been entirely fulfilled by appellant; appellee cannot base any right upon the limitation of the Secretary of War's order of December 5, 1901, made almost a quarter of a century ago, in view of congressional action and appellant's enlargement of the Chicago River as authorized by the Secretary of War.

Counsel refer to delays in this litigation and attempt to lay the blame therefor upon appellant, the fallacy of which we have heretofore shown, and they state (Appellee's Brief, p. 320):

> "and the patience with which it has accepted the inordinate and inexcusable delays in this litigation show the keen desire of the Government that no possible injustice should be done to the people of Chicago."

For upwards of a third of a century, during the construction and operation of this Canal, Congress, (advised and notified by its own officers of the initiation of the project, of the progress of the work, its purposes, probable effects upon the Great Lakes and claimed injuries to navigation), to whom power to regulate commerce was delegated and who could have acted, not only did not act adversely, but, on the contrary, passed acts recognizing the diversion. The

delay mentioned by counsel shows the lack of any real basis for appellee's claim to an injunction, and demonstrates that the person really concerned is the Chief of Engineers of the United States Army who seeks sanction for the assertion of arbitrary and unlimited power and control over navigable waters, because, a condition precedent to the Secretary of War's acting, in each instance, is the Chief of Engineer's recommendation. If such power be conceded to him, this one officer of the United States Army can frustrate the efforts of a sovereign state in the interest of public health.

Respectfully submitted,

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SUPREME COURT

No. 161

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO, *Appellant.*

vs.

THE UNITED STATES OF AMERICA, *Appellee.*

Appeal from the District Court of the United States for the Northern District of Illinois Eastern Division.

PETITION FOR REHEARING ON BEHALF OF APPELLANT.

HECTOR A. BROUILLET,
CLYDE L. DAY,
GEORGE F. BARRETT,
LOUIS J. BEHAN,
EDMUND D. ADCOCK,
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HAWKINS & LOOMIS CO., LAW PRINTERS, CHICAGO.

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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO, *Appellant*, vs. THE UNITED STATES OF AMERICA, *Appellee.*	Appeal from the District Court of the United States, for the Northern District of Illinois Eastern Division.

PETITION FOR REHEARING ON BEHALF OF APPELLANT.

Now comes The Sanitary District of Chicago, appellant, and respectfully petitions this Honorable Court to vacate the order of affirmance entered herein on the 5th day of January, 1925, and to grant a rehearing in the above entitled cause.

To refresh the Court's recollection of the oral argument, the appellant submits herewith as an appendix to this petition for rehearing, a printed transcript of the oral argument of all counsel.

In support of this petition for rehearing, appellant submits suggestions hereto attached and made a part hereof.

Respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By HECTOR A. BROUILLET,
CLYDE L. DAY,
GEORGE F. BARRETT,
LOUIS J. BEHAN,
EDMUND D. ADCOCK,

SUGGESTIONS IN SUPPORT OF FOREGOING PETITION FOR REHEARING.

(1) The Court's construction of the treaty of January 11, 1909, between the United States and Great Britain, concerning Canadian boundary waters, is erroneous.

The opinion of the Court as to this treaty is as follows (Printed Opinion, p. 3):

> "It (the United States) has a standing in this suit not only to remove obstructions to interstate and foreign commerce * * * but *also to carry out treaty obligations to a foreign power* bordering upon some of the lakes concerned * * * With regard to the second ground, the treaty of January 11, 1909, with Great Britain, expressly provides against uses *'affecting the natural level or flow of boundary waters'* without the authority of the United States or *the Dominion of Canada within their respective jurisdictions and the approval of the International Joint Commission agreed upon therein* * * * a withdrawal of water on the scale directed by the Statute of Illinois * * * cannot be done without the consent of the United States, *even were there no international covenant in the case.*"

The clause of the treaty quoted by the court above, is contained in Article 3 of the Treaty, which relates only to uses, obstructions or diversions of boundary waters as shown by the following, which includes the language quoted by the Court (Treaty, Article 3, Appellant's Narrative 532):

> "It is agreed that, in addition to the uses, obstructions, and diversions heretofore permitted or hereafter provided for by special agreement between the Parties hereto, no further or other uses or ob-

structions or diversions, whether temporary or permanent, OF BOUNDARY WATERS *on* either side of the *line, affecting the natural level or flow of boundary waters* on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdiction and with the approval, as hereinafter provided, of a Joint Commission, to be known as the International Joint Commission."

Boundary waters are defined to be waters from main shore to main shore of the lakes and rivers or the portions thereof along which the international boundary passes, as shown by the preliminary article of the Treaty. (Appellant's Narrative 530.)

"For the purposes of this Treaty boundary waters are defined as the waters *from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes,* including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers and waterways, or waters flowing from such lakes, rivers and waterways, or the waters of rivers flowing across the boundary."

The International boundary does not pass along or through Lake Michigan, it is not a boundary water, and it is excluded by the treaty from all regulations covering boundary waters.

That the provisions of the treaty as to boundary waters do not apply, is further demonstrated by Article 1 of the Treaty. The first paragraph of Article 1 provides that navigation of

"all navigable boundary waters"

shall forever continue free and open for the purposes of commerce to the inhabitants and citizens of each country. But in order to give this right of navigation in the

waters of Lake Michigan, the second paragraph of the Article 1 expressly provides

> "that so long as this treaty shall remain in force this same right of navigation shall extend to the waters of Lake Michigan * * *."

In other words, Lake Michigan is not of the class of boundary waters. (Appellant's Narrative 531.)

The powers of the International Joint Commission are fixed and determined by the following language of Article 8 of the Treaty (Appellant's Narrative 535):

> "The International Joint Commission shall have jurisdiction over and shall pass upon all cases involving the use or obstruction or diversion of the waters with respect to which under articles 3 and 4 of this treaty the approval of this commission is required."

Article 4 has no bearing upon the matters in issue and relates principally to the construction of remedial works in boundary waters.

Lake Michigan is not within the provisions of Articles 3 or 4, is not under the jurisdiction of the International Joint Commission and there are no "treaty obligations to a foreign power" (Printed Opinion, p. 3) as to diversions from Lake Michigan to be carried out by the United States.

The United States reserved complete and exclusive control over all diversions from Lake Michigan by Article 2 of this Treaty (Appellant's Narrative, p. 531):

> "Each of the High Contracting Parties reserves to itself, or to the several State Governments on the one side and the Dominion or Provincial Governments on the other, as the case may be, subject to any Treaty provisions now existing with respect thereto, the exclusive jurisdiction and control over the use and diversion, whether temporary or permanent, of all waters on its own side of the line

which in their natural channels would flow across the boundary or into boundary waters; but it is agreed that any interference with or diversion from their natural channel of such waters on either side of the boundary resulting in any injury on the other side of the boundary, shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion or interference occurs; *but this provision shall not apply to cases already existing or to cases expressly covered by special agreement between the parties hereto.*

It is understood, however, that neither of the High Contracting Parties intends by the foregoing provision to surrender any rights which it may have to object to any interference with or diversions of waters on the other side of the boundary the effect of which would be productive of material injury to the navigation interests on its own side of the boundary."

Full jurisdiction of the United States over diversions from Lake Michigan was reserved by Article 2, subject only to the two conditions mentioned, viz.:

(1) The right of injured parties of Canada to sue; and

(2) The right of Canada to object on account of material injury to its navigation interests.

With neither one of those conditions can this Court be concerned. In any event, the conditions do not apply, because, (*first*) the Chicago diversion to the full amount was then existing; and (*second*), the Chicago diversion to the amount of 10,000 cubic seconds feet was settled and agreed upon between the two countries at the time the treaty was made; and Canada could not object as the Treaty was designed to settle all questions then (Appellant's Narrative 530):

> *"pending between the United States and the Dominion of Canada involving the rights, obligations or interests of either in relation to the other or to the inhabitants of the other along their common frontier,"*

The only pending, unsettled and disputed question was the one involving the right of appellant to divert 4,000 cubic seconds feet through and by way of the Calumet River and the Calumet Sag Channel, in addition to the 10,000 cubic seconds feet then diverted through and by way of the Chicago River, for the International Waterways Commission established under joint legislation of Canada and the United States, had settled the right of Illinois and appellant to divert up to 10,000 cubic seconds feet through the Chicago River, and the Commission found that there was no dispute as to this amount. This is shown particularly by the report of the International Waterways Commission of January 4, 1907, on the Chicago Drainage Canal. (Appellant's Narrative 505, *et seq.*)

In speaking of the diversion through the Chicago River, the Commission by said report, stated that (Appellant's Narrative 522):

> "It has satisfied itself upon that point nor does it wish to re-open the case of the Chicago Drainage Canal as designed and built. It accepts that as a fixed fact, with its attendant diversion of 10,000 cubic feet per second through the Chicago River. *The extension of the system to the Calumet River alone is in question,* * * *."

This report was signed by all of the Canadian and American members of the International Waterways Commission.

The plain terms of the treaty preclude any construction that Lake Michigan is under the jurisdiction of the International Joint Commission or that the United States

is obligated to any foreign power as to diversion of water from Lake Michigan. However, reference to the reports of the International Waterways Commission whose duties required them to study and make recommendations concerning all questions between Canada and the United States as to the terms and basis of a treaty then in contemplation and the negotiations leading up to the making of the treaty, and its ratification by the United States Senate, leave no doubt as to our position. When the question of ratification was before the Foreign Relations Committee of the United States Senate, Chandler Anderson of the State Department, at the request of said committee, gave it a memorandum explaining the provisions of the treaty. Among other things, this memorandum stated (Proceedings of Foreign Relations Committee, 57-62d Congresses):

"It is important to have in mind certain general features of the treaty which may be briefly stated as follows:

(1) The distinction which is drawn in the preliminary article between the boundary waters and waters which are tributary to boundary waters and waters of rivers flowing across the boundary is carefully observed in Articles II and III of the treaty.

(2) Article II applies only to waters which in their natural channels would flow across the boundary or into boundary waters, that is before they have passed the boundary or become part of boundary waters; and it cannot by any construction of its provisions apply to the use or obstruction or diversion of boundary waters.

(3) Article III by its express provisions applies only to uses, obstructions or diversions of boundary waters, and cannot by any construction of its provisions have any application to the use, obstruction or diversion of tributary waters or waters of rivers flowing across the boundary.

(4) Article IV, exclusive of the paragraph thereof relating to the pollution of waters, applies only to waters flowing from boundary waters or to the waters of rivers flowing across the boundary *after they have passed the boundary* and can have no application to waters tributary to boundary waters or to waters of rivers flowing across the boundary before they have passed the boundary.

(5) The jurisdiction of the International Commission is strictly limited by Article III to cases arising under Articles III and IV; and it will be observed that under Article IV the Commission is given no jurisdiction over cases arising under the pollution clause of that Article; it is evident, therefore, that the International Commission can have no jurisdiction over cases arising under Article II.

* * *

The waters of Lake Michigan do not come within the definition of boundary waters, as defined in the preliminary article of the treaty, and it will be noted that in Article 1 of the treaty the waters of this lake are not included among the boundary waters of the Great Lakes system but are covered by special provision in the second paragraph of that article.

The question has arisen as to the effect upon Lake Michigan of the provisions of Article II which deals with tributary waters or rather with all waters which in their natural channels flow across the boundary or into boundary waters, and the objection is made that if the provisions of this Article apply to Lake Michigan, the right to recover damages for injuries resulting on the other side of the line on account of the diversion of tributary waters might interfere with the diversion of the waters of Lake Michigan for the purposes of the Chicago Canal.

In response to this objection, *attention is called to the express provision in this Article that it shall not apply to cases already existing which would seem to cover, and was certainly intended to cover, the Canal system at Chicago.*

But in any case, an examination of the provisions of the article will show that, as pointed out in paragraph numbered (6) above, the right of action for

damages applies to private or individual interests in distinction from public or governmental interests, and such interests are given only the same rights which similar interests on the American side of the line would have in the absence of this treaty.

In effect, this provision brings the Canadian interests within the jurisdiction of the United States for this purpose.

The treaty, therefore, recognizes that the settlement of the question of the use of waters of Lake Michigan is purely a domestic question and leaves undisputed the governmental rights of the United States with respect to it.

But this is the view of Great Britain and Canada as shown by the last paragraph of the article which reserves to each of the High Contracting Parties any right which it may now have to object to any interference with or diversion of waters on the other side of the boundary, the effect of which would be productive of material injury to the navigation interests on its own side of the boundary. This provision relates to public interests in distinction from private interests, and would be wholly unnecessary if under the preceding provisions of the article any right was given to recover damages for injuries to public interests on the other side of the line."

Hon. Elihu Root, Secretary of State, was before the Foreign Relations Committee of the Senate at the time that it was considering the ratification and at the time the memorandum of the said Chandler Anderson was before the Committee, and in explaining the terms of the treaty, said (Proceedings of Foreign Relations Committee, 57-62d Congresses, pp. 271-2):

"The great bulk of the water goes on the Canadian side and the Waterways Commission that was appointed some time ago to deal with the question of the lake levels reports, I think, that 36,000 feet can be taken out on the Canadian side and 18,500 feet on the American side without injury to the Falls. I thought it wise to follow the report of the Commission and put in 1,500 feet in addition to get round

numbers, so our limit is higher than we want but their limit would not be cut down below what it is because there are three companies on the Canadian side who have works there. Then there is this further fact why we could not object to this 36,000 cubic feet on the Candian side: We are now taking 10,000 cubic feet per second out of Lake Michigan at Chicago, and I refused to permit them to say anything in the treaty about it. I would not permit them to say anything about Lake Michigan. I would not have anything in the treaty about it, and under the circumstances, I thought it better not to kick about this 36,000. They consented to leave out of this treaty any reference to the Drainage Canal and we are now taking 10,000 cubic feet per second for the Drainage Canal, which really comes out of this lake system."

(International Waterways Commission Report, Canadian Section, April 25, 1906, Appellant's Narrative 103; Report of Entire Commission, May 3, 1906, Appellant's Narrative 104.) Article 5, which fixes the amount of the diversions of the two countries at Niagara Falls, as do the other articles of the treaty contain substantially the recommendations of the International Waterways Commission.

Appellee agrees with us as to the rights of the United States over Lake Michigan under this Treaty (Its Brief, p. 234):

> "*Article 2 expressly reserves to the United States exclusive control over diversions from Lake Michigan* so long as there is no material injury to Canadian navigation interests."

Obviously, the words, "so long as there is no material injury to Canadian navigation interests", do not state the legal effect of the second paragraph of Article 2 of the Treaty to which they are intended to refer, because that merely gives the right to Canada to object and objection could only be made through diplomatic channels

(not important here). Canada is precluded from making objection as the Chicago diversion to the amount of 10,000 seconds feet was settled and agreed upon prior to the making of the Treaty.

(2) The permits of May 8, 1899 and of July 11, 1900, and others of similar import, are not revocable at the will of the Secretary of War, or for any reason except those reserved by the permits themselves. There is no provision of statute by which the Secretary of War may revoke.

In fact, there is no provision of statute by which the Secretary of War may revoke permits for causes reserved in the permit, but we assume that the general power to grant contains impliedly the right to make reservations in the permit entitling him to modify it, if permittee does not comply with the conditions. Section 18 of the Rivers and Harbors Act of March 3, 1899, is the only section empowering the Secretary of War to cause the modification of an obstruction once approved by him and that covers a bridge which had previously been approved, when such bridge has become unreasonably obstructive to navigation, and then only after hearing with the right of the owner of the bridge to be heard. Appellant had acted upon these permits and had expended large sums of money in reliance upon them. Appellee has never made the contention and the point was never argued which is stated by the Court's opinion in this case (Printed Opinion 6) as follows:

> "After this statute was passed, the Secretary of War granted various permits which are relied upon by the appellant, *although in their nature they all were revocable licenses*".

The Secretary of War cannot revoke at will for the very good reason that he has not been delegated that authority. This position does not go to the extent of saying,

however, that Congress might not by itself by some act revoke the permits or direct the Secretary of War to do so. This construction of the power of the Secretary of War to revoke a permit acted upon, was placed upon the similar act of September 19, 1890, by Attorney General Richard Olney, in an opinion to the Secretary of War rendered June 25, 1894; (21 Opinions of Attorneys General, 41, 45).

> "The remaining, question, whether the permit granted February 13, 1894, can, under the existing circumstances of this case, be revoked, is more easily answered. It does not involve the issue whether the power to rescind a permit is a necessarily implied element of the power to grant it, or whether, all the circumstances remaining the same, the Secretary of War, after granting a permit, might cancel it because of a change of mind as to the wisdom or propriety of his original action. Upon the facts appearing in the papers submitted the circumstances are not unchanged, but on the faith of the permit the Altamonte Water Company has gone forward and made contracts, spent large sums of money, and otherwise materially altered its situation. *Under such circumstances,* I am of the opinion that the Secretary of War *is not now at liberty to revoke the permit.*"

Many times this Court has held that the Secretary of the Interior could not erase from the approved rolls the names of citizens of Indian tribes or revoke the approval of an allotment of land, because there was no such power granted by statute.

Garfield v. *U. S., ex rel., John E. Goldsby,* 211 U. S. 249.

Same case, 30 App. Cases, Dist. of Col. 177;

nor could the Secretary of the Interior revoke without express statutory authority approval of an easement for a railroad over public lands.

Noble v. *Union River Logging & R. R. Co.,* 147 U. S. 162.

See, also,

U. S. v. *Schurz*, 102 U. S. 378.
Moore v. *Robbins*, 86 U. S. 530.
Mosgrove v. *Harper*, 33 Ore. Repts., 252.

That permits granted by the Secretary of War are not in their nature revocable at the will of the Secretary, is shown by the provision for the granting of permits by the Secretary of War for the diversion of waters at Niagara Falls, as contained in Section 2 of the Act for the Preservation of Niagara Falls, known as the Burton Act, June 29, 1906. (34 U. S. Stat. at Large, 626.) In the first part of said Section 2 of said Act, the Secretary of War was authorized "to grant permits for the diversion of water in the United States from said Niagara River or its tributaries for the creation of power to individuals, companies or corporations," etc. There is no provision for revocation and the power is general, similar to the power granted under Section 10 of the Rivers and Harbors Act of March 3, 1899. Under a later provision of said Section 2 the Secretary is authorized "to grant revocable permits from time to time" to another class of persons, indicating that Congress construed general authority to grant permits not specifically designated to be revocable as not implying authority to revoke at will.

The court may have assumed that the permits of the Secretary of War granted under the Rivers and Harbors Act of March 3, 1899, or the similar section of the Rivers and Harbors Act of September 19, 1890, had been construed to be revocable at will or in their nature revocable, by this court in *United States* v. *Chandler-Dunbar Water Power Company*, 229 U. S., 51, 57 Law Edition, 1063, 1077. However, an examination of the record in that case, discloses that the permits of January

12th and April 2, 1888, August 13, 1892, July 6, 1893, March 14, 1899, June 9, 1902, December 12, 1902, March 10, 1903, May 8, 1905, June 15, 1906, April 14, 1909 issued in the Chandler-Dunbar Water Power Company case, which were expressly revoked by the act of Congress of 1909, were by express terms revocable at will. In other words, the Secretary of War by the permit itself reserved the right to revoke for any cause.

The condition as to revocation in said permits in the *Chandler-Dunbar case,* is as follows:

> "That at any time, whenever in the opinion of the Secretary of War it may for any reason be expedient that this license should be revoked, the Secretary of War shall and may cause notice to that effect to be given. * * *"

It is significant that during the period that the Secretary of War was issuing permits to the appellant in which he reserved the right only to modify or revoke for certain reasons stated in the permit, he was at the same time issuing permits to another corporation by which he reserved the right to revoke at will or for any cause. He recognized that he might issue two kinds of permits, one revocable at will, the other not revocable, or only revocable or to be modified for a cause stated in the permit, and permits of the latter character he chose to issue to appellant.

(3) The Court has erroneously construed the language and effect of the permits of May 8, 1899, July 11, 1900, July 23, 1901, December 5, 1901 and September 11, 1907, and the statement of January 8, 1913, of Secretary Stimson, mentioned on pages 6 and 7 of the Court's opinion.

The opinion of the Court states (Printed Opinion, p. 6):

> "On May 8, 1899, the Secretary, on application of the appellant, granted permission to open the channel, assumed in the recitals *to have a flowage capacity of* 300,000 *cubic feet per minute* with a velocity of one and one-quarter miles an hour, on the conditions that the permit should be subject to the action of Congress (which was superfluous except as a warning); that if at any time the current created proved to be *unreasonably obstructive to navigation or injurious to property he reserved the right to close or modify the discharge;* * * *."

The statement in the foregoing quotation does not correctly interpret the recital of said permit as to the 300,000 cubic feet per minute. The court has also erroneously stated the effect of condition 2 of the May 8, 1899, permit, in that the right to revoke is limited to unreasonable obstructions to navigation or injury to property by current *in the Chicago River*, instead of to navigation or property wherever located, as the opinion of the court seems to indicate.

The recital states merely that appellant

> "has been heretofore granted permission by the Secretary of War to make certain improvements in the Chicago River for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of 300,000 cubic feet per minute, with a velocity of 1¼ miles per hour," (Appellant's Narrative, p. 481.)

That recital does not state the capacity of appellant's Sanitary and Ship Canal to be only 300,000 cubic feet per minute. It merely mentions the improvement of the Chicago river channels under Secretary of War permits. The capacity of that channel was fixed by state law, and it was so constructed to have a capacity of 10,000 cubic seconds feet. The only reference to the channel is in that

portion of the preamble preceding that just above quoted—

> "whereas the Sanitary District of Chicago, a municipal corporation organized under the laws of the State of Illinois, has constructed an artificial channel from Robey Street, Chicago, to Lockport,"

The capacity of the channel as fixed by state law, as planned and as actually constructed, was within the knowledge of the Chief of Engineers and the Secretary of War at the time the permit was granted, as expressly advised by War Department Engineers in the discharge of their duties.

If the Court by reference to said 300,000 cubic feet per minute as stated in the preamble to said permit, intends thereby to treat said permit as only authorizing a diversion of that amount, subject to the express conditions of the permit, or if the Court for any other reason has construed the said permit of May 8, 1899, as not authorizing a diversion in excess of 300,000 cubic feet per minute, subject to the conditions of said permit, then a reference to certain pertinent facts surrounding the issuance of said permit will clearly demonstrate this misapprehension.

Beginning with the passage of appellant's act of May 29, 1889, the Chief of Engineers and the Secretary of War were given copies of the act, which act fixed the capacity of appellant's main channel at not less than 10,000 cubic seconds feet of water, the plans of appellant's main channel made under the requirements of said act, and information as to progress of construction of the channel. These facts came to them from the Division Engineer at Chicago. (Appellant's Narrative, pp. 451-454-455.)

August 16, 1895, the Chief of Engineers and Secretary of War received a report from a Special Engineer Com-

mission, consisting of Col. Poe, Major Rufiner and Major Marshall. (Appellant's Narrative, p. 465.) This Board of Engineers was to report upon

> "the probable effect of the operation of the Chicago Drainage Canal upon the lake and harbor levels and upon the navigation of the Great Lakes and their connecting waterways."

In that report they state the capacity of appellant's Main Channel to be 600,000 cubic feet per minute, as follows: (Appellant's Narrative, p. 467.)

> *"Throughout the rock sections and those sections in which there is a preponderance of hard material or where rock may appear, the section adopted is designed according to law for a flow of 600,000 cubic feet of water per minute, which means provision for a population of three million people."*

Major Marshall, United States Engineer at Chicago, under the direction of the Rivers & Harbors Act of June 3, 1896, made a report to the Chief of Engineers which was submitted to Congress by the Secretary of War (H. R. Document 353, 54th Congress, 2d Session) and in connection with the capacity of Appellant's main channel, stated (Appellant's Narrative 487):

> "To comply with the law of the State of Illinois under which this drainage canal is constructed—it has been constructed of a capacity to discharge 600,000 cubic feet per minute through the section excavated in rock and 300,000 cubic feet per minute throughout the earth section—the law requires a discharge of 20,000 cubic feet per minute for each 100,000 inhabitants of the drainage district, which at present requires more than 300,000 cubic feet and in a few years will require the full 600,000 cubic feet discharge through the canal."

The report of Major Marshall, dated April 24, 1899, to the Chief of Engineers, in regard to the application of Appellant to open its canal, which was granted by the

permit of May 8, 1899, in referring to the capacity and amount of withdrawal, stated (Appellant's Narrative 479):

> "20,000 cubic feet per minute must be taken from Lake Michigan for each 100,000 population of the District; already nearly 400,000 cubic feet must be taken, * * *."

The capacity of the artificial channel mentioned in the permit of May 8, 1899, as having been then constructed—being 600,000 cubic feet per minute, or 10,000 cubic feet per second—authorized to be opened, was clearly made known to the Chief of Engineers and the Secretary of War through United States engineer officers in the performance of their duty.

There are other attendant facts that are important. April 21, 1891, as soon as Appellant's main channel was surveyed and its capacity determined upon, the Board of Trustees of Appellant adopted a project for the improvement of the Chicago River to make the artificial channel under construction available (Appellant's Narrative 454)—

> "Resolution of April 21, 1891, of the Board of Trustees of the Sanitary District of Chicago.
>
> * * *
>
> Resolved, That this Board hereby ordains that The Sanitary District of Chicago do forthwith enter upon, use, widen, deepen and improve the Chicago River from its mouth at Lake Michigan to the South Branch thereof, and also the South Branch thereof, together with the South and West Forks thereof so as to make the same a proper and sufficient supply channel for the main channel heretofore surveyed from the Chicago River to Joliet; and further, that the Acting Chief Engineer be, and he is hereby, directed immediately to investigate and report upon the capacity of said River and its said South Branch and Forks for that purpose, and also as to any changes that should be made therein, and that a copy of this resolution,

certified by the clerk, be forthwith transmitted to the Mayor and Common Council of the City of Chicago, and the Secretary of War of the United States."

The Chicago River, its South Branch and West Fork thereof, was then narrow, shallow and tortuous. To permit taking through the river channels the amount of water represented by the capacity of Appellant's main channel required their enlargement. To permit the taking through the channels of those rivers the water *immediately* necessary at the time of the opening of the main channel, comparatively small improvement was necessary. The excavation and work under the permits of June 3, 1896, October 28, 1897, November 30, 1898, March 10, 1899, May 12, 1899 and June 13, 1899, corrected the river channels for this latter purpose (Appellant's Narrative 473 to 478). This was the improvement referred to in the preamble of the May 8, 1899, permit. The application for the first permit for the temporary improvement of these river channels is significant (Appellant's Narrative 88)—

"The work of The Sanitary District of Chicago has progressed so far that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey Street, Chicago, to Lockport in Will County, Twenty-eight miles distant.

Our connection with Lake Michigan must be through the Chicago river with the West Fork of the South Branch of which we make a junction at Robey Street. We send herewith a map showing in a general way our plans for improving the Chicago River by widening and deepening at the points indicated thereon by red hatchings and by figures which refer to explanation, given in the legend on the map. It is desired to so correct and regularize the cross section of the river as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of one and one-quarter miles per hour."

July 3, 1896, permit was granted as to this first improvement of the Chicago River to make the cross section so as to secure a flowage of 300,000 cubic feet per minute and contained the condition that a current should not be introduced in the Chicago River. The other permits for similar improvements contained like conditions.

Therefore, after this work was done, the flowage capacity of the Chicago River channels had been so corrected that 300,000 cubic feet per minute could be taken through without creating an objectionable current, and Appellant was thus authorized by these various permits to take that amount of water through. The main channel, however, was constructed with the capacity to take twice that much water—which larger amount of water would be required in a few years—and appellant desired approval of the entire plan by the Secretary of War. It, therefore, made the application for the May 8, 1899, permit, which permit was granted to:

> "open the channel constructed and cause the waters of Chicago River to flow into the same, subject to the following conditions: * * *
>
> 2. That if, at any time, it become apparent that the *current* created by such drainage works in the south and main branches of the Chicago river, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago river and its South Branch. * * * (Appellant's Narrative 482.)

According to said permit the only condition of taking from Lake Michigan the amount of water which represented the maximum capacity of Appellant's channel—10,000 cubic second feet—was the reservation that the Secretary of War might determine the manner in which

the water should be taken through the Chicago River, such manner and such determination to be based upon the enlargement of the river so that a *current* in said river should not exist unreasonably obstructive to navigation. And the immediate provision for the very material enlargement of the Chicago River Channels to take through them an amount of water equal to the capacity of appellant's Main Channel and consented to by the July 11, 1900, permits about now to be mentioned, leaves no question as to the intention of the Secretary of War under condition 2 of said May 8, 1899, permit.

The permit approved all modifications of the navigable capacity of the Great Lakes and reserved merely the right of the Secretary of War to approve the manner of taking the full amount of water required for Appellant's canal through the Chicago River channels.

On July 11, 1900, two permits were issued pursuant to the application of The Sanitary District, authorizing the enlargement of the Chicago River, its South Fork and West Fork, by deepening it from seventeen to twenty-six feet and widening it at all points to two hundred feet. This improvement cost almost $11,000,000 and no objection has ever been made by appellee to the current in the River created after the improvement was completed with the diversion of 10,000 cubic seconds feet. The permits themselves refer to the May 8, 1899, permit and the conditions thereof. The application for the permits and the permits were granted under the reserved condition 2 of the permit of May 8, 1899,—the Secretary of War should determine the manner in which the full amount of water should be taken through the Chicago River channels, so that a current would not be created unreasonably obstructive to navigation. This Court, however, in its opinion, with reference to said permits, stated (Printed Opinion, p. 6):

"On July 11, 1900, improvements of the Chicago River were permitted with the statement that the permission did not affect the right of the Secretary to revoke the permit of May 8, 1899."

The above language carries the inference that the Court assumed that the condition of the July 11, 1900, permits allowed the Secretary of War to revoke the permit of May 8, 1899, at will, and that modification of the May 8, 1899, permit was not confined to the causes or conditions expressly reserved in said permit. The July 11, 1900, permits reiterate the conditions of the May 8, 1899, permit. That the Court's construction of the July 11, 1900, permits is erroneous, is shown by a mere reading of it. We quote from the first one as they are alike, (Appellant's Narrative 92):

"Sir: I have the honor to acknowledge the receipt of your letter of April 26th last, requesting, in behalf of the Sanitary District of Chicago, permission to change, alter and improve the Chicago River, from Lake Street to Ashland Avenue, in Chicago, as shown on maps which accompanied your said letter.

Replying thereto I beg to inform you that there is no objection on the part of the War Department to the prosecution of work of improvement of Chicago River, specified in the above mentioned letter and delineated on the maps which accompanied the same, it being understood that this statement as to the attitude of the War Department shall not be understood as involving the general government in any way with the expense incident to the carrying out of the project, and does not in any way invalidate, waive or affect the right of the Secretary of War to regulate or revoke the permit granted under date of May 8, 1899, to the Sanitary District of Chicago, to divert the waters of the Chicago River and cause them to flow into the artificial channel, *such permission* being subject to the following conditions, viz.:

* * *"

The balance of the July 11, 1900, permit is a quotation from the May 8, 1899, permit of all the conditions of same—being three in number. The words:

> "such permission being subject to the following conditions"

—refer to the May 8, 1899, permit and modify the words

> "to regulate or revoke the permit granted under date of May 8, 1899"

and confine regulation and revocation to the conditions of the May 8, 1899, permit. These permits show that the Secretary of War then considered that the permit of May 8, 1899, authorized the diversion, subject to the conditions, to the maximum capacity of the main channel, for the work to be done under the July 11, 1900, permits would double the flowage capacity of the Chicago River channels so that the 10,000 seconds feet could be taken through without creating a current injurious to navigation.

The orders of the Secretary of War of July 23, 1901, and December 5, 1901, were made expressly under condition 2 of the May 8, 1899, permit, under which the Secretary of War was to regulate the manner by which the Appellant should withdraw water through the Chicago River channels, and that only. The conditions of those two permits of July 23, 1901, and December 5, 1901, refer to condition 2 of said permit of May 8, 1899, for that condition is quoted in the permit of December 5, 1901. The subject matter of the two permits was the regulation under said condition 2. Condition 2 of December 5, 1901, permit, and the similar condition of the permit of July 23, 1901 (Appellant's Narrative 25):

> "That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require"

cannot be construed as revoking, or attempting to revoke, the consent given by the Secretary of War as to the modification of the navigable waters of the United States other than the Chicago River. That condition must be confined to condition 2 of the May 8, 1899, permit as to the method of taking through the Chicago River channels the amount of water required by Appellant for the operation of its main channel to its full capacity, for in issuing the said orders or permits of July 23 and December 5, 1901, the Secretary was attempting and assuming only to act under the reservation contained in condition 2 of the May 8, 1899, permit as to regulating the withdrawal through the Chicago River.

Condition 2 of the permit of September 11, 1907, as to the North Shore Channel, which was merely to allow making connection with Lake Michigan at Wilmette, Illinois, and was not to increase the diversion through the Chicago River and merely a part of the Chicago river diversion (Appellant's Narrative 82):

> "That the total diversion of water from Lake Michigan through the Chicago River into the Illinois River shall be no greater than already authorized by past War Department permits"

—referred only to past permits, which were that the Secretary of War had approved the diversion to the capacity of the main channel—10,000 cubic feet per second—and had consented to the modification of all navigable waters of the United States resulting from such diversion subject only to regulating the enlargement of the Chicago River channels to take through them the amount required by appellant.

The permit of June 30, 1910, as to the Calumet Sag Channel was issued for convenience and necessity and was not intended to in any manner affect the rights of

either party, and, as the Court states, was not to be used in the litigation to test rights. No revocation of authority given by the Secretary of War under previous permits was intended nor can Appellant be considered in any respect to have waived rights already granted.

The statement of the Secretary of War of January 8, 1913, was merely the refusal of an application to remove the limitation theretofore made by the Secretary of War under condition 2 of the permit of May 8, 1899, the reason for which limitation had been then removed, as the Chicago River channels had been enlarged to take the amount of water fixed by the capacity of Appellant's main channel—10,000 cubic seconds feet. There was no attempt at that time by the Secretary of War to revoke any permit given, even if he considered he had the power.

(4) The Attorney General did not attempt under the bill of complaint in this proceeding, to exercise any authority other than that alleged to have been given him by Section 12 of the Rivers and Harbors Act of March 3, 1899.

This Court, in its opinion said (Printed Opinion, p. 1):

> "The prohibition of such alterations and obstructions in the Act of March 3, 1899, c. 425, Sec. 10; 30 Stat., 1121, 1151, is set out at length and relied upon but the frame of the bill does not exclude a reliance upon more general principles if they were needed in order to maintain it."

Outside of the general priciple that the pleading of a party shall be taken most strongly against him, there is nothing in the bill of complaint here which indicates that the Attorney General sought to exercise power under any other Act of Congress than the Act of March 3, 1899, or that he attempted to act under general authority. On the contrary, it was admitted by counsel for appellee on

oral argument in reply to questions put by Mr. Justice McReynolds, that the basis of the bill of complaint was the Act of March 3, 1899. (See pages 132 and 133, Printed Transcript of Oral Argument appendix hereto.)

The March 3, 1899, Act does not authorize the Attorney General to institute suits to enjoin the creation or continuance of an obstruction. It merely authorizes him by injunction to remove a structure.

Respectfully submitted,

HECTOR A. BROUILLET,
CLYDE L. DAY,
GEORGE F. BARRETT,
LOUIS J. BEHAN,
EDMUND D. ADCOCK,

I hereby certify that this petition for rehearing in this case is filed in good faith, the contents thereof and the suggestions attached are believed to be true, and the same is not interposed for delay.

Respectfully submitted,

EDMUND D. ADCOCK,
Of Counsel for Appellant.

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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO, *Appellant*, vs. THE UNITED STATES OF AMERICA, *Appellee*.	Appeal from the District Court of the United States, for the Northern District of Illinois, Eastern Division.

TRANSCRIPT OF ORAL ARGUMENT.

Washington, D. C.,
Monday, Dec. 8, 1924.

The above-entitled cause came on, for oral argument, before the full court, at 1:40 o'clock P. M.

Appearances:

For the appellant:

Edmund D. Adcock, Esq.; George F. Barrett, Esq.; Louis J. Behan, Esq.; and Clyde L. Day, Esq.

For the appellee:

Hon. James M. Beck, Solicitor General of the United States.

Joseph B. Fleming, Esq., Special Assistant to the Attorney General.

Amicus curiae, in favor of appellant:

Daniel N. Kirby, Esq.

Amici curiae, in favor of appellee:

Hon. Andrew B. Dougherty, Attorney General of Michigan;

Harvey D. Goulder, Esq., for Lake Carriers' Association;

Hon. Herman L. Ekern, Attorney General of Wisconsin;

Hon. U. S. Lesh, Attorney General of Indiana;

Hon. C. S. Ferris, Deputy Attorney General of New York.

The Chief Justice: This is the case in which I have had some conversation with counsel with reference to the time to be taken?

Mr. Beck: Yes, sir. In this case, if the Court please, which is one of exceptional magnitude, in addition to the counsel for the Government and the counsel for the Sanitary District of Chicago, there appear as *amici curiae*, on behalf of appellant, the attorneys-general of the States of Illinois, Missouri, Louisiana and Tennessee, and on behalf of the United States there appear as *amici curiae*, the attorneys-general of Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin.

The Chief Justice referred to the informal negotiations, or, at least, to a discussion with respect to the—

The Chief Justice: Well, you might say "negotiations." (Laughter.)

Mr. Beck: With respect to the time; and as I understand it will be your Honors' pleasure to give the appellant three hours and the counsel for the Government two hours and a half.

The Chief Justice: That will make five and a half hours.

Mr. Beck: That will make five and a half hours, yes.

The Chief Justice: Yes, I think that is fair, on account of the number of counsel engaged and the importance of the case, as well as the number of facts that the record would indicate that require discussion.

But there is one question that I would like to suggest: This case has been long in dispute, or the controversy has been long in dispute. It goes back as far as the time when I was Secretary of War. And I do not remember what happened then; but I remember that a number of counsel came before me with reference to the matter—perhaps it was a permit; I have forgotten just what it was.

Mr. Adcock: It only related, your Honor, to one adjunct of the main channel—one phase of it.

The Chief Justice: Well, I do not know enough about it to know whether it should disqualify me or not. Counsel ought to have advised themselves with respect to that; but if there is the slightest objection, or if there is any doubt about it, of course I will withdraw.

Mr. Adcock: There is no objection, so far as we are concerned. I might state in this connection also that it was when Mr. Justice McReynolds was attorney general that the suits were instituted; but that is no objection to his sitting in the case, so far as we are concerned.

Mr. Justice McReynolds: Did I bring the suit when I was attorney general?

Mr. Adcock: Yes, sir, under Section 12 of the Act of March 3, 1899.

Mr. Justice McReynolds: Well, do you not think that I had better excuse myself?

Mr. Adcock: Not so far as we are concerned.

Mr. Justice McReynolds: Well, how about this record? Is this record just dumped in on us, like it was dumped in on the District Court, without any modification?

Mr. Adcock: I think you will find that there is filed with the appellant's brief, as an appendix, a condensation of the record.

Mr. Justice McReynolds: Well, but has the record been made up in accordance with the rule, or is it sent up as originally taken?

Mr. Adcock: It is sent up as originally taken.

Mr. Justice McReynolds: Well, you know we have talked about that rather severely. How many pages of this record are there?

Mr. Adcock: About 5,000.

Mr. Justice McReynolds: Well, do you expect anybody to read that?

Mr. Adcock: The condensation complies, I think, with the rule, so far as that is concerned—the condensation that we have prepared and printed and furnished, in connection with the galley proofs, etc., that have been given to counsel; that embraces practically everything that is material.

Mr. Justice McReynolds: I know; but why was not the record made to comply with the rule?

Mr. Adcock: Well, at that time we thought that it would probably be impossible to condense the record; and there was an order entered by the lower court, which I think complies with the rules, directing it to be taken up as the record was printed in the lower court.

Mr. Justice McReynolds: I do not think that that record ought to be imposed on us.

Mr. Adcock: I do not believe that there is any imposition on the Court here as the record now stands, with the condensation. I do not believe there are any disputed questions of fact here that are very material.

Mr. Justice McReynolds: Well, is it a question of fact involved in this case, or a question of law?

Mr. Adcock: I do not believe there is any material question of fact, no; practically all the facts that are material are admitted.

Mr. Justice McReynolds: Well, I was wondering what all this record was about, if there was no question of fact?

Mr. Adcock: Well, there was a great deal of testimony taken in regard to the hydraulics of the Great Lakes; there were a great many documents that were put in evidence that were necessary to show what had been done, running over, probably, a century, since the Act of March 2, 1827.

May I proceed?

The Chief Justice: You may.

Mr. Adcock: The Chief Justice was making a statement—

Mr. Beck (Interposing): Before you proceed, let me say that the Government concurs in the suggestion of Mr. Adcock that it will be agreeable to both counsel, if your Honor, the Chief Justice, and your Honor, Mr. Justice McReynolds, should sit in this case.

The Chief Justice: That is understood, then. I do not think that either side is making any great concession (laughter). But those of us that are affected by it, I am sure, appreciate the courtesy.

Mr. Adcock: Well, the only thing the Chief Justice did was to find that, as Secretary of War, he had no right to do anything, as the Chief of Engineers had not recommended anything. (Laughter.) And I think Mr. Justice McReynolds, as Attorney General, merely signed the bill as one of his ordinary duties, and probably never read it.

The Chief Justice: Well, you may proceed, Mr. Adcock.

I suggest this to counsel: If you will give me a list of the assignment, or the allocation of the time—

Mr. Adcock: I was just going to suggest that.

The Chief Justice (Continuing): I will keep the time as against your own colleagues, and of course, as against yourselves and the other side, in the same way.

Mr. Adcock: Well, in addition to the *amici curiae* as mentioned by the Solicitor General, in support of the appellant, there is the City of Chicago; the Association of Commerce of Chicago; some commercial organizations of St. Louis; the Mississippi Valley Association; and similar organizations of Memphis; and similar organizations of New Orleans.

As I understood the suggestions which were made to the Chief Justice in regard to the time, and as indicated when the *amici curiae* were permitted to file briefs, and when they asked permission to participate in the argument, there was to be one counsel representing the *amici curiae* to be heard.

Mr. Daniel N. Kirby, of St. Louis, will use half an hour of our time; and he will be the only counsel representing the *amici curiae* to argue on the appellant's side.

Mr. Beck: May I just say that I did not understand that there was to be only one *amici curiae* to argue; and the arrangement of the appellee was that Mr. Goulder, of Cleveland, should speak for twenty minutes for the Lake Carriers' Association; and Attorney General Dougherty, of Michigan, should speak for the seven Attorneys-General who are freindly to the Government.

The Chief Justice: Well, you can arrange it as you please among yourselves; but I think it will help you if you can give me an assignment of time, so that I can keep a record of it.

Mr. Adcock: Yes, sir.

I have been selected to present the case for appellant; and I know of no reason for that, except that I have been with the case since the beginning of the year 1913, and most of the evidence was presented by me in behalf of the Sanitary District. Otherwise, I would not have the assurance to accept that duty of attempting to present a matter of this kind.

And I expect to be able to present the case—or we intend to on our side to present all of our contentions in our opening statement; and on behalf of the appellant directly and on be-

half of the *amici curiae*, I desire, of the two hours and a half which we have, to present the matter in the opening in two hours, reserving only half an hour for closing. And I will endeavor to make it shorter, if it can be done; but on account of the circumstances that must be called to the attention of the Court, I fear that I will be unable to do that.

The Chief Justice: Very well; you may proceed, Mr. Adcock.

Oral argument of Edmund D. Adcock, Esq., on behalf of appellant, The Sanitary District of Chicago.

Mr. Adcock: This comes here from the District Court at Chicago, and is a direct appeal.

The decree in that court which is questioned here, enjoins the Sanitary District of Chicago, the appellant, which is a municipal corporation organized under the laws of that State, from diverting or abstracting from Lake Michigan any waters in excess of 4,167 cubic seconds feet, or 250,000 cubic minutes feet. Now, when you speak of seconds feet or minutes feet, it means the number of cubic feet of water that will pass a given point in a minute, or in a second.

Mr. Justice Holmes: Just give me that number again: How many second feet?

Mr. Adcock: 4,167 cubic seconds feet of water.

Mr. Justice VanDevanter: That means cubic feet per second?

Mr. Adcock: Cubic feet per second; and we speak of it shortly as "seconds feet"; and that corresponds to 250,000 cubic feet per minute.

The decree of the lower court held that Section 20 and Section 23 of the Sanitary District Act, that is, the act under which appellant was organized, were void and unconstitu-

tional, in that they limited the quantity of water that that act provided should be diverted from Lake Michigan—

Mr. Justice Sutherland (Interposing): That is, an act of the State of Illinois?

Mr. Adcock: That is an act of the State of Illinois. The act was passed on May 29, 1889, a little over a third of a century ago; and construction was commenced almost immediately, and occupied a period of approximately ten years.

Section 20 of that act provides that there shall be caused to flow or drain from Lake Michigan through the channel —that is the sanitary and ship canal, which is the main diversion channel of the appellant, and Des Plaines and Illinois Rivers, not less than 20,000 cubic feet of water per minute for every 100,000 population. The population at the time the decree was entered being approximately 3,000,000 people, the required withdrawal, which was mandatory, was 10,000 cubic seconds feet of water, or 600,000 cubic feet per minute.

The application of the Commerce Clause of the Constitution is involved in the case; and I think the jurisdiction of this Court was decided in the case of *Cummings* v. *Chicago*, in 188 U. S.

There is also, perhaps, involved, the interpretation of the treaty between the United States and Great Britain as to boundary waters. The Government would give a certain construction to that treaty; and we give a certain construction; and there is some dispute about that.

The case involves the construction of section 10 of the Rivers and Harbors Act of March 3, 1899. That will be found at page 108 of our brief; and beginning at page 106, you will find set out in juxtaposition the acts of 1890 and 1899, which were similar; that is, sections 7 and 10 of the 1890 act were similar to sections 9, 10 and 12 of the 1899 act.

Mr. Justice Holmes: Which is the act we are called upon to deal with?

Mr. Adcock: The 1899 act, which appears in the second column.

Mr. Justice Holmes: Yes, I see it.

Mr. Adcock: The case involves, primarily, the whole plan and program that the State of Illinois adopted in 1889, for the protection of the water supply of Chicago and its environs; to provide for that city a pure drinking water; and to keep Lake Michigan, the only water supply, unpolluted.

It also involves—which was one of the features of this act—the program of the State of Illinois as to making provision for a deep waterway from Lake Michigan to the Gulf of Mexico. There were two objects of that act.

The decree in this case, your Honors, if made effective immediately and without condition—the Court suspended the operation of the decree during the appeal here—would absolutely prostrate all the works that have been built by the appellant, at a cost of something like $100,000,000.

It would create a condition, which is admitted, I think, in the record in this case; there is no testimony to the contrary; and I think the Government in its brief so admits—it would create an intolerable condition, which would cause conditions of nuisance in the Chicago River; the Sanitary and Ship Canal, the main channel; and the Des Plaines and Illinois Rivers. If the amount of water were limited as contended for by our opponents, the Chicago River, with its pollution of sewage and drainage at numerous times during the year would go into Lake Michigan, carrying with it that pollution, polluting the water supply; and the result would be the raging of typhoid fever and other water-borne diseases—perhaps causing the condition which existed prior to the construction of the canal, when the rate would run up to 170 deaths per 100,000 inhabitants; whereas now the typhoid death rate is less than 8 per 100,000.

Mr. Justice VanDevanter: The United States brought this suit, did it?

Mr. Adcock: The United States brought the suit.

Mr. Justice VanDevanter: Now, it was decided on what ground? What was the ground of the lower court's decision?

Mr. Adcock: I am coming to that. The United States instituted the suit; and there was a question of jurisdiction in the lower court. That is, the suit was brought at the instance of the Attorney General, under section 12 of this Rivers and Harbors Act of 1899, appearing at page 108 of our brief. There is a question as to whether the Attorney General under that section had the authority to institute the suit; and therefore, there was a question of jurisdiction. The act provides that he may institute a suit for injunction to cause the removal of a structure or part of a structure. This suit is not for that purpose.

Mr. Justice McReynolds: Read the act and let us see what it says.

Mr. Adcock (Reading):

> "And further, the removal of any structures or parts of structures"—

Mr. Justice McKenna: What are you reading from?

Mr. Adcock: Page 109 of my brief.

> "And further, the removal of any structures or parts of structures erected in violation of the provisions of the said sections may be enforced by the injunction of any circuit court exercising jurisdiction in any district in which such structures may exist, and proper proceedings to this end may be instituted under the direction of the Attorney General of the United States."

Mr. Justice McReynolds: Is that the only thing he is authorized to do under the act?

Mr. Adcock: That is the only thing.

Mr. Justice McReynolds: And what did he ask in this case?

Mr. Adcock: He asked that the appellant be enjoined from diverting from Lake Michigan any waters in excess of 4,167 feet.

Mr. Justice McReynolds: Well, was that an attack on structures, or what was it?

Mr. Adcock: He attacked our right to take that quantity of water—in excess of that quantity.

Mr. Justice VanDevanter: Well, the bill was framed with the idea that you did have the right to take some water, was it?

Mr. Adcock: It was framed with the idea that we had the right to take 4,167 seconds feet.

Mr. Justice VanDevanter: He assailed the right to take anything in excess of that?

Mr. Adcock: Yes, sir.

Mr. Justice VanDevanter: On what ground did the bill proceed?

Mr. Adcock: The bill proceeded on this ground—perhaps I should state that there were two suits here; and I was just about to state the issues which are involved—

Mr. Justice VanDevanter (Interposing): Were they brought at the same time?

Mr. Adcock: No. The first suit was brought March 23, 1908; and the second one was brought October 6, 1913. The first one was consolidated with the second one. I do not believe, so far as the Court is concerned, it is necessary to give much attention to the first suit; because it only involved an adjunct to the main diversion channel; and the second suit was instituted to enjoin the diversion from any and all sources in excess of a certain amount.

And that second bill of complaint set up the organization of appellant under this act of May 29, 1889; and the construction of the works; and alleged that it was withdrawing from Lake Michigan an amount of water in excess of 4,167 seconds

feet, which was the limitation that it was claimed by the bill that the Secretary of War had placed upon the amount of the withdrawal.

It also set up the issuance of various permits. The first permit was issued May 8, 1899, and was unlimited in amount.

The Chief Justice: We will suspend at this point.

Thereupon, at 2:00 o'clock p. m., the Court took a recess until 2:30 o'clock p. m.

AFTER RECESS.

Oral argument of Edmund D. Adcock, Esq.,—Resumed.

The Chief Justice: Mr. Adcock, you may proceed.

Mr. Adcock: I had started to answer a question at the time of the recess.

Mr. Justice VanDevanter: With regard to that permit that you spoke of: To what extent had permits been issued before this suit was begun, and what, if any, restrictions were there in those permits?

Mr. Adcock: The first permit, for the opening of the main channel, provided that it should cause the water to flow through the channel, subject simply to three conditions. That is known as the permit of May 8, 1899.

One condition was, that if Congress should act to modify or control the amount of the diversion, then the permit should be of no further force or effect. Of course, I take it that that is the law anyway.

The second condition was that if the withdrawal of this water from Lake Michigan through the channels of the Chicago River and its branches to the Sanitary and Ship Canal, should create a current unduly destructive to navigation, or

unreasonably destructive to navigation on that river, then the Secretary of War might close said discharge, or modify it.

There was just one other condition, a third condition, which I do not think is material here, and that is that the Sanitary District should be responsible for damages; and that was held in the *Corrigan* case, to apply only so far as the United States was concerned.

Mr. Justice VanDevanter: Now, is it true that in the beginning the Chicago River flowed into Lake Michigan?

Mr. Adcock: Yes, sir, in its natural condition.

Mr. Justice VanDevanter: And that the natural flow of the rivers and lakes beyond the Chicago River to the west go through to the Mississippi River?

Mr. Adcock: Yes, sir.

Mr. Justice VanDevanter: And that you opened the channel through, and thereby you reversed the natural flow of the Chicago River?

Mr. Adcock: Yes, sir.

Mr. Justice VanDevanter: So that you carry the water away from Lake Michigan?

Mr. Adcock: Yes; a certain quantity of water is diverted by our channel—

Mr. Justice VanDevanter (Interposing): Now, certain permits were issued by the Secretary of War?

Mr. Adcock: Yes, sir.

Mr. Justice VanDevanter: Were they permits directly to divert, or were they permits authorizing or extending to the construction of these improvements, which had as their object this diversion of waters?

Mr. Adcock: The first permit provided that the channel—that is, the channel that had then been constructed—might be opened through the Chicago River to flow through the Chicago

River to that channel, subject to the conditions which I have mentioned.

Now, the Chicago River and its branches—perhaps I can show you better on this map which we have set up—

Mr. Justice VanDevanter (Interposing): Before you get to that, where did your limit of 4,167 feet come in? Where does that come in?

Mr. Adcock: There was a later limitation, or an order made by the Secretary of War limiting the amount of that diversion to 4,167 feet.

Mr. Justice VanDevanter: When was that made?

Mr. Adcock: That was on December 5, 1901; and it was made solely because of the current in the Chicago River, and made because of objections by navigation interests at that time.

Now, right there is the very important proposition in this case: At the time that this limitation was made, the channels of the Chicago River and its branches were like this—Here (indicating on map) we have a map showing the Sanitary District works; and the limits of the Sanitary District (indicating); and also the Continental Divide, which you, Mr. Justice VanDevanter, spoke about, through which this channel is cut (indicating), which is a very small elevation of land, about seven or eight miles from Lake Michigan; and only seven or eight feet above the mean level of Lake Michigan.

The Chicago River—the main river—is shown on this map in blue (indicating); and it extends from Lake Michigan out about a mile west. Then we have the south branch of the Chicago River, running in a southerly and southwesterly direction (indicating); and then we have the West Fork of the south branch (indicating), which connects with it; and the main Sanitary and Ship Canal (indicating), the northern terminus of which is on the West Fork of the south branch, at Robey Street, in Chicago (indicating); and the main channel

extends from that point (indicating), Robey Street; and the West Fork of the south branch, twenty-eight miles, to a point just above Joliet, in Will County, and extends through Cook County—

The Chief Justice (Interposing): Is there not another river, the Calumet River, there?

Mr. Adcock: Yes, sir; that is the one that your Honor had to do with; that is an adjunct of the main channel.

The Chief Justice: Well, that runs into Lake Michigan, naturally, does it not?

Mr. Adcock: The Sag channel? The Calumet River runs into Lake Michigan naturally; and the Sag channel, or the "Calumet Sag channel," as it is called, runs from the Little Calumet River at this point (indicating), at Blue Island, westerly to the main channel at Sag, Illinois, and is merely an adjunct of the main channel. And it was designed to take care of the drainage south of the earlier limits of the Sanitary District.

Mr. Justice Sanford: Does that reverse the flow of the Calumet River?

Mr. Adcock: Yes, sir, that reverses the flow of Calumet River.

Mr. Justice McReynolds: Now, you came and asked the Secretary of War for a permit to divert this water upstream?

Mr. Adcock: Yes, sir, and to open the channel.

Mr. Justice McReynolds: And he gave you the permit?

Mr. Adcock: He gave us the permit.

Mr. Justice McReynolds: Under certain conditions?

Mr. Adcock: Yes, sir, under certain conditions.

Mr. Justice McReynolds: Well, how did this suit arise? Was it because you had violated those conditions, or what was it?

Mr. Adcock: The Secretary on December 5, 1901, limited—

Mr. Justice McReynolds (Interposing): Did what?

Mr. Adcock: Limited the amount of the diversion, and specified that it should not be over 4,167 seconds feet.

Mr. Justice McReynolds: He had authority to do that, did he?

Mr. Adcock: There is a question as to whether he had any power to regulate. I think he did have the power to limit the diversion because of the current in the Chicago River; but for no other reason. I think the power did not exist in him to limit or control the quantity of the water, so far as any other conditions were concerned. His one duty as an administrative officer was with reference to our works as they affected the Chicago River.

Now, coming to this proposition: The Chicago River at the time that limitation was made was very shallow. It was only 16 or 17 feet deep, and as narrow as 80 or 90 feet at places; and at that time the Secretary of War limited the diversion because of that condition.

The Sanitary District, however, in cooperation, as we will show later, with the Government, and appreciating that it was necessary to enlarge the channels of the Chicago River and its branches, in order to take the amount of water required through them, without creating a current unduly obstructive to navigation in the river, applied to the Secretary of War for permission to so enlarge those rivers that the larger diversion could be taken through without creating this current.

And accordingly, applications were made very shortly after the channel was open, which was January 17, 1900. I mention that fact, because it is one of the guide posts of the litigation: It applied to the Secretary of War to permit it to deepen the South Branch and the West Fork of the South Branch, from the northern terminus of the channel that had been constructed

through the Chicago River, to twenty-six feet, and widen it at all points to 200 feet.

Now, that entailed the complete enlargement of that river, the raising of bridges, the replacement of old center pier bridges with modern bascules; and the expense that the Sanitary District was put to in that improvement was upwards of $10,500,000. The Secretary of War on July 11, 1900, pursuant to applications, authorized the work to be done; that is, the work of enlarging these rivers, and the work was completed about the year 1912.

The limitation that is spoken of—the December 5, 1901, limitation—which was made when the river was in the shallow and narrow condition, is the basis of this lawsuit. That is the sole ground upon which the Government brought its injunction.

Mr. Justice VanDevanter: That limitation was not revoked when the last permit for enlargement was granted?

Mr. Adcock: It happens that the December 5, 1901, limitation, the basis of the lawsuit, was made after the permits of July 11, 1900, but before the work under those July 11, 1900, permits had been completed.

Mr. Justice McReynolds: What were the conditions of the permit of 1901?

Mr. Adcock: The conditions of the permit? The limitation was made under condition 2 of the original permit, and the limitations were, as we conceive them, the same as the limitations of the original permit.

Mr. Justice McReynolds: What were they? Please tell me that.

Mr. Adcock: I will read that permit, if I may. In order to get at that permit, it is necessary to read the first limitation; there was a limitation made on the 9th of April, 1901,

which appears at page 23 of our narrative statement, and which reads as follows:

> "Whereas, under date of May 8th, 1899, the Secretary of War granted permission unto The Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport, and cause the waters of Chicago River to flow into the same, upon the following condition, *inter alia*:"

And then it quotes the condition 2 of the original permit:

> "'(2) That if, at any time, it becomes apparent that the current created by such drainage works in the south and main branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its south branch.'
>
> "And whereas, It is alleged by various commercial and navigation interests that the present discharge from the river into the Drainage Canal sometimes exceeds three hundred thousand (300,000) cubic feet per minute, causing a velocity of nearly three (3) miles per hour, which greatly endangers navigation, in the present condition of the river.
>
> "Now, therefore, This is to certify that the Secretary of War, upon the recommendation of the Chief of Engineers, hereby directs said Sanitary District to regulate the discharge from the river into the Drainage Canal so that the maximum flow through the Chicago River and its south branch shall not exceed two hundred thousand (200,000) cubic feet per minute."

Then on July 23, 1901, that permit was again changed as to amount, by simply permitting the Sanitary District to take through the river 300,000 cubic feet per minute, between the hours of 4:00 p. m. and 12:00 o'clock midnight; that is the time when there was not much navigation on the river.

We have the permit of December 5, 1901, which is at page 24 of appellant's narrative, and which reads as follows—and this is the one upon which this suit is based.

Mr. Justice Brandeis: And the last one that was issued?

Mr. Adcock: Not the last one. I will come to that later. The other one was only a temporary matter. This permit of December 5, 1901, reads as follows:

"Whereas, Under date of May 8th, 1899, the Secretary of War granted permission unto the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport, and cause the waters of Chicago River to flow into the same, upon the following conditions, *inter alia*."

And after again quoting condition 2, it continues:

"And whereas, the Secretary of War subsequently directed said Sanitary District of Chicago, to regulate the discharge of water into the Chicago Drainage Canal so that the maximum flow through the Chicago River shall not exceed 200,000 cubic feet per minute from midnight to 4 p. m., nor 300,000 cubic feet per minute from 4 p. m. to midnight;

"And whereas, Said Sanitary District of Chicago has applied to the Secretary of War for permission to increase the flow between midnight and 4 p. m., daily, to 250,000 cubic feet per minute; and the Chief of Engineers has recommended that the increase applied for be granted, but that the rate of flow from 4 p. m. to midnight be reduced to 250,000 cubic feet per minute, so that the flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day.

"Now, therefore, This is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto the Said Sanitary District of Chicago permission to regulate said discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, upon the following conditions:

"(1) That this permission shall be in lieu of the present authorized rates of flow as stated above.

"(2) That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"(3) That said Sanitary District of Chicago shall be responsible for all damages inflicted upon navigation interests by reason of the increase in flow herein authorized."

Then on January 17, 1903—and all these limitations were before the work of the improvement, the enlargement of the Chicago River, under the July 11, 1900, permits was completed—. On January 17, 1903, a permit was issued allowing the Sanitary District to increase the withdrawal or discharge through the Chicago River to 350,000 cubic feet per minute, during the winter months.

Mr. Justice McReynolds: Well, all of that is just detail leading up to your final conclusion, is it not?

Mr. Adcock: Yes, sir.

Mr. Justice McReynolds: Well, what is the final thing that you are contending for?

Mr. Adcock: Well, our proposition is simply this: That so far as these permits are concerned, we have complied with every condition made by the Secretary of War as to the current in the Chicago River, which was the only condition that he placed upon our withdrawal of the waters—

Mr. Justice McReynolds (Interposing): And therefore you claim you have the right to take out an unlimited quantity of water : Is that your conclusion?

Mr. Adcock: No. We have the right to take the amount fixed by our Illinois act, and the amount which we have provided by our works to take, which is approximately 10,000 seconds feet of water.

Mr. Justice McReynolds: And the Secretary of War has nothing to do with it?

Mr. Adcock: The Secretary of War has nothing to do with the quantity that we might take from Lake Michigan, except in so far as the taking of that water through the channels

of the Chicago River and its branches might effect those river channels or navigation thereon.

Mr. Justice McReynolds: Wholly without regard to the Secretary of War's opinion in regard to the navigability of the Lakes as affected by that diversion?

Mr. Adcock: Yes.

Mr. Justice McReynolds: Is that the issue in this case?

Mr. Adcock: That is one of the issues, your Honor.

Mr. Justice McKenna: What is the other issue?

Mr. Adcock: Another situation is this: That under the act of March 2, 1827, we were authorized—that is, the State of Illinois was authorized, to build a canal from Lake Michigan to the Illinois River, uniting the waters of Lake Michigan with those of the Illinois River.

Mr. Justice Holmes: What was the date of that act?

Mr. Adcock: March 2, 1827.

Mr. Justice McReynolds: Was anything said about the size of the canal in the act?

Mr. Adcock: No. The State was to exercise its discretion in that respect. There was no limitation as to the size of the canal.

Mr. Justice McReynolds: And nothing was done until 1900?

Mr. Adcock: A canal was built in 1848 by the State.

Now, that is the situation, so far as the permits are concerned.

And it is also to be said, as to the act of March 2, 1827—there is a whole lot more to that proposition, as to the authority of Congress, or the authority given by Congress to the State of Illinois than merely the act of March 2, 1827; there are many circumstances that must be taken into consideration before that proposition can be left.

Mr. Justice Brandeis: Is there any contested question of fact to which we must address our attention?

Mr. Adcock: There is this question of fact: It is claimed by the Government that the withdrawal of the water in excess of 4,167 seconds feet will lower the levels of the Great Lakes and the connecting canals, and thereby injure navigation.

Mr. Justice Sutherland: On the Lakes?

Mr. Adcock: On the Lakes. There is also the allegation as to the Chicago River. There may be a question, some small question, of fact as to the current of the Chicago River.

On that proposition we merely say this: That no evidence was introduced by the Government as to the current in the Chicago River until after all of our evidence was put in. It was merely rebuttal, and I believe an afterthought. The only testimony was the testimony of certain Lake captains as to what they thought the current was there in the Chicago River and its branches when their boats met other boats, or were abreast of other boats.

On the other hand, we had the testimony of our chief engineer, Mr. Isham Randolph, who laid out the works, and who testified that there could be taken through the river, and that he planned the works so as to take the 10,000 cubic feet per second through the channels of those rivers and there would not be a current of over a mile and a quarter an hour —that is, under the enlarged improvement. And Mr. Wisner also testified to that; he was chief engineer of the Sanitary District for a time. The report of General Bixby, who was one of the chief of engineers of the United States Army, in 1906, with reference to the conditions of current in the Chicago River, stated that the current would not exceed 1.2 miles per hour. That is all set forth in the brief.

So that Secretary of War Stimson in 1913, when he refused the application to remove this limitation and for express authority for 10,000 seconds feet diversion, made no

objection to any current in the Chicago River; and so far as we know, the Government has never found—there is no Government engineer who ever found that the improved or enlarged cross section of those rivers would create a current —or that a current would be created in those rivers with the 10,000 seconds feet taken through—

Mr. Justice McReynolds (Interposing): Now, you have the permission of the War Department to take out 300,000 cubic feet per minute, have you?

Mr. Adcock: We have permission, it is our contention, to take out through the Chicago River the amount of water that would result from the deepening and widening of the Chicago River and its branches under the July 11, 1900, permits.

Mr. Justice Brandeis: Even if that would affect the navigation of the Great Lakes?

Mr. Adcock: Yes, sir.

The Chief Justice: Was there not a reservation as to navigability?

Mr. Adcock: There was not a reservation, no, not in the permit. The only reservation was with reference to the current in the Chicago River. Our contention is this: That so far as the acts of Congress are concerned—and the only two acts that I know of are the act of September 19, 1890, and the act of March 3, 1899—there are no express words showing that Congress has intended to occupy the field as to diversions of water, or to regulate the diversions; and that it has not delegated to the Secretary of War any authority to fix or regulate the amount of diversion, but only the administrative duty with reference to the conditions that might exist in the Chicago River.

Now, that is under a general proposition of law that I think has been upheld by this Court in numerous cases; and Mr. Justice Holmes, in the case of *Missouri* v. *Illinois*, stated

that, so far as the United States is concerned, it had done nothing to forbid this diversion. That was a suit that involved this very diversion.

Mr. Justice Brandeis: Will you just pardon me if I interrupt you with a question?

Mr. Adcock: Yes, sir; certainly.

Mr. Justice Brandeis: Will you state what your position is in regard to the contention which, I understand, the Government has made, that this diversion does injuriously affect the navigation on the Great Lakes?

Mr. Adcock: Our position is merely this on that question: No witness was ever presented in this case to testify as to observing any lowering of the levels of the Lakes, or as to any injury to navigation. Nobody testified that they were unable to load a boat as heavy because of this diversion.

Mr. Justice Brandeis: Well, do you deny that navigation upon the Lakes is affected?

Mr. Adcock: Yes, sir.

Mr. Justice Brandeis (Continuing): By the diversion? You deny that, do you?

Mr. Adcock: We take this position, your Honor: That there is no evidence in the record from which it can be determined that any injury did exist to navigation by reason of the claimed lowering of the surface elevations of the Lake —that is, Lake Michigan—some five inches, as claimed here, and Lakes Erie and Ontario certain smaller amounts.

Mr. Justice Brandeis: And is it also your contention that, if the Government, through the Chief of Engineers, has reached the conclusion that the diversion would injuriously affect navigation, that is an immaterial fact?

Mr. Adcock: It is an immaterial fact; because the Chief of Engineers—and the Secretary of War can only act upon the recommendation of the Chief of Engineers—has not been delegated that authority.

And then our further proposition is that, by other acts of Congress, some fifteen or so in number, Congress has recognized this diversion; has sought to provide for its continuance, and has not only not forbidden it, but has done things which would indicate an intention that it should exist.

Mr. Justice Brandeis: And you mean by recognizing the diversion that it recognized the amount of the diversion, and not merely the fact that there was some diversion?

Mr. Adcock: Yes, sir.

The Chief Justice: Mr. Adcock, the permit that you refer to is that signed by W. Cary Sanger, Assistant Secretary of War, dated December 5, 1901?

Mr. Adcock: Yes, your Honor.

The Chief Justice: Now, that provides that "the Secretary of War reserves the right to close said discharge through such channel, or to modify it to such extent as may be demanded by navigation?"

Mr. Adcock: Yes.

The Chief Justice (Continuing): "demanded by navigation and property interests along said Chicago River and its south branch?"

Mr. Adcock: Yes, sir.

The Chief Justice: Now, you claim, do you, that that navigation mentioned there is limited only to the navigation on the Chicago River?

Mr. Adcock: Yes, sir, because the original permit was limited only to that. That was the condition to the original permit, and the Secretary of War was acting only under Condition 2 in limiting it to that amount.

The Chief Justice: And then a further condition, No. 2, is:

> "That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require."

Mr. Adcock: Yes, sir.

The Chief Justice; Now, do you say that—

Mr. Adcock (Interposing): Yes, sir, we say that that does not enlarge Condition 2 of the original permit, because the limitation was made by virtue of Condition 2 of the original permit.

Mr. Justice McReynolds: What did the court below hold on these issues?

Mr. Adcock: The court held that the Secretary of War had the authority to limit this discharge; that is, that because the Sanitary District found itself in this lawsuit without an express authorization by the Secretary of War as to the amount, the injunction must follow; that it did not make any difference how it happened that the express authorization did not exist. It is our position that that December 5, 1901, permit—

Mr. Justice McReynolds (Interposing): If you will tell me what the court decided, I will be much obliged to you.

Mr. Adcock: That is what the court decided.

Mr. Justice McReynolds: The court decided that the Secretary of War had power to control this situation?

Mr. Adcock: Yes, sir.

Mr. Justice McReynolds: And that he issued an order limiting you to so much water?

Mr. Adcock: Yes, sir.

Mr. Justice McReynolds: And that you must not exceed it; is that right?

Mr. Adcock: That is right. And that it did not make any difference whether the cause of that limitation had been removed or not. It is our position that, when the limitation of 4,167 seconds feet was made there was a reason for it, because of the restricted condition of the river, but that

when we removed that reason, then necessarily the limitation itself would have no further force or effect.

Mr. Justice McReynolds: Did the Secretary of War decide that you had removed that limitation?

Mr. Adcock: That we had removed the limitation? There is no statement by the Secretary of War as to any current in the Chicago River unreasonably obstructive to navigation, but there was only a current therein of a mile and a quarter an hour, which was the amount that the Secretary of War indicated would be satisfactory.

The Chief Justice: Did the district judge rule, in effect, that these reservations by the Secretary of War gave him complete control?

Mr. Adcock: No. He simply held that, because we did not have an express authority as to an amount—that is, because the Secretary of War had not removed that limitation, it did not make any difference why he failed to remove the limitation; that for that reason, the injunction should follow.

Mr. Justice VanDevanter: In other words, the court recognized that there might be other reasons why that limitation should be preserved, and that even though one reason was removed, the others might still subsist?

Mr. Adcock: Yes, sir—that he might not like the color of the applicant's eyes.

Mr. Justice Brandeis: And did the court make any finding of fact in the matters which you say are in issue?

Mr. Adcock: No. There was simply a short decree.

Mr. Justice VanDevanter: Was it shown or admitted that the level of the Lakes was a good deal lowered?

Mr. Adcock: No; we do not admit that.

Mr. Justice VanDevanter: Well, was it shown in the evidence?

Mr. Adcock: There were many expert witnesses put on the stand who testified as to the determination of increment of these various outlet rivers, and that from that, theoretically, Lakes Michigan and Huron would be five inches less in depth because of this diversion, and that the surface elevation would be that much lower than it would have been.

Mr. Justice VanDevanter: Well, did they state that they had measured the water and found that there was that much difference in the level of the lakes?

Mr. Adcock: No; they made no measurement showing that. They made a great number of measurements of the discharge of these outlet rivers; and they took from the records the stage of the controlling lake at that time; and from those discharge measurements they attempted to obtain the increment of the outlet rivers. Now, an increment is the increase or decrease in the flow of the outlet river, due to the rise or fall of the controlling lake stage of one foot. And having determined the increment, they then divided the amount of the diversion—say 10,000 seconds feet—by the amount of the increment; and the fraction that was obtained represented the fraction of a foot that it was claimed the lakes were lowered.

Now, there were a great many things that had to be done, and done accurately, in order to make a discharge measurement, or a number of discharge measurements of these outlet rivers. The actual elevations—the mean elevations—of the lakes for the ten years immediately preceding the opening of this channel were lower than they were for the ten years subsequently thereto. There are a great many things that enter into the determination of the levels of the lakes. They fluctuate from time to time. Perhaps I could just show you that here on this map (indicating).

The lake levels were higher after the opening of the channel than they were before.

Mr. Justice VanDevanter: Habitually, or only for a time?

Mr. Adcock: Ten years; the ten-year mean elevation.

Mr. Justice VanDevanter: Then what happened?

Mr. Adcock: Well, the testimony in this case was practically closed in 1914; and that ten-year period is the only comparison that was made. I think I have here (indicating) the map which shows that. That (indicating) is a hydrograph of the Great Lakes, and shows the fluctuations from year to year, from 1860, to the end of 1914 in the lake surfaces. Lake Superior is not claimed to be affected in any way.

Mr. Justice Brandeis: What is that dip that you have there on the map?

Mr. Adcock: This dip here (indicating)?

Mr. Justice Brandeis: No; further up; a little further along.

Mr. Adcock: That condition is due to the fact that at this time, or about this time, I think Lake Superior was regulated. That is, movable dams were put in the St. Mary's River to regulate the level of Lake Superior, and so as to keep it within smaller limits than the others. And that was done for the benefit of the water power there.

Mr. Justice VanDevanter: Since then there has been less fluctuation?

Mr. Adcock: So far as Lake Superior is concerned. I think it has been kept within probably a foot and a half. You see, before that—here (indicating on map) is the figure for 1900. There were fluctuations, just the same as existed afterwards; and that is due to the supply which comes from rain on the surface of the lakes, and also on the drainage areas.

Mr. Justice VanDevanter: Near your right hand on the map is Lake Superior; what is that lowest figure shown there?

Mr. Adcock: That (indicating) is 1911. That was the low water time.

Now, in connection with that proposition, we show that in 1903, practically all of these critical points of navigation were improved by the United States. That reference plane of the improvement was placed approximately six inches lower, as the engineer testified, as the claimed effect on Lake Michigan. And the testimony also shows that the only vessels there claimed to be affected by this diversion are the ore-carrying vessels.

We have in this record a table which shows the ports between which the ore-carrying vessels ply, which shows that there have at all times been depths of water greater than the project depths as fixed by Congress, and that all these harbors—all these critical points of navigation—were improved under appropriations by Congress, and what navigation there is now has been entirely provided for by appropriations of Congress—that is, in supplying greater depths, etc.; and the depths are greater than the natural channels provided before there was any improvement. And that therefore, Congress, presumably, has taken care of this diversion.

Mr. Justice Butler: Is there any testimony in the record as to conditions since 1914? Or is there anything to show what volume of water per second has been taken from Lake Michigan since that time?

Mr. Adcock: By the Sanitary District?

Mr. Justice Butler: Yes.

Mr. Adcock: There was testimony put in in 1923, just before this decree was entered, which showed the population of the Sanitary District at that time. The population was shown in 1914, and the increase was at the rate of about 72,000 a year. And the statute expressly provided how much water should be taken.

Mr. Justice Butler: How much was taken?

Mr. Adcock: 10,000 seconds feet.

Mr. Justice Butler: 10,000 seconds feet?

Mr. Adcock: Yes, sir; they had 3,000,000 inhabitants, and that was the amount that was required according to the statute.

Mr. Justice Butler: How long has that amount been taken? I am trying to get at the situation which has developed since the taking of the testimony or the making of the records.

Mr. Adcock: That has developed progressively since 1900, when the population was about a million and a half. And I think in 1913 the population was about 2,500,000, and the increase is about half a million between that time and 1923—perhaps a little more.

Mr. Justice VanDevanter: And the lake levels you have not brought down to 1923?

Mr. Adcock: That has not been done. All that hydraulic testimony was put in by 1914. The later testimony that was put in, 1923, was more in relation to the settlement of the decree.

Mr. Justice Brandeis: How much have you increased the draft in the ten years from the year 1914 to date?

Mr. Adcock: How much have we increased the draft?

Mr. Justice Brandeis: Yes.

Mr. Adcock: The draft of vessels?

Mr. Justice Brandeis: No, the water—the drawing off of water by you?

Mr. Adcock: Oh. There has been an increase of about 2,500 seconds feet in the amount of water drawn; I think about that. That has been according to the population. I think it was about 7,500 seconds feet in 1914.

Mr. Justice Brandeis: You have increased it about 2,500 seconds feet?

Mr. Adcock: Yes, sir.

The Chief Justice: Mr. Adcock, before you go on, you referred to section 12 and section 10 of the act of 1899.

Mr. Adcock: Yes, sir.

The Chief Justice: I understood you to say that there was no authority, in your judgment, to get an injunction against what was here enjoined?

Mr. Adcock: Yes, sir.

The Chief Justice: Because the act referred only to an injunction against the removal of any structures or parts of structures?

Mr. Adcock: Yes, sir.

The Chief Justice (Continuing): erected in violation of the previous section. Have you not got to refer back to section 10 in order to find out what that means? Does not section 10 provide "that it shall not be lawful to excavate and fill, or in any manner, alter, or modify the course, location, condition, or capacity—"

Mr. Adcock (Interposing): Yes, sir.

The Chief Justice (Continuing): "of any port, roadstead, haven, harbor, canal, lake," and so on, or the channel of any navigable water of the United States. Is that not incorporated into section 12?

Mr. Adcock: But it expressly provides for the removal of a structure or part of a structure. Now, if you will notice section 10—

The Chief Justice (Interposing): Well, you have put in a good deal of the structure, have you not?

Mr. Adcock: The purpose here—what is sought in this suit is merely an injunction against the operation, or the continuance, as they claim, of an obstruction.

Now, if you will notice, section 10 of the act of 1890, which is printed on page 109 of my brief opposite the act of 1899, provides that:

"The creating or continuing of any unlawful obstruction in this act mentioned may be prevented and such obstruction may be caused to be removed by the injunction of any circuit court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the Attorney General of the United States."

In other words, the old act properly provided for the institution of a suit of this kind for the relief here sought; whereas the new act does not provide for that; and it must have been the intention of Congress that the Attorney General should not have that power; otherwise, why the change?

The Chief Justice: Do you mean that Congress deliberately left out the remedy by injunction where what was done would alter or modify the "course, condition, location, or capacity of any port" etc.?

Mr. Adcock: It only related to the removal of a structure, and that was what the Secretary of War had to do with. That is, all of the things that are named in sections 9 and 10 that he may authorize are structures; that is, something built in navigable waters; something that occupies some position in those waters. And there is no provision for an injunction to remove an obstruction.

Now, this channel that was constructed here (indicating on map) is the main Sanitary and Ship Canal, as I pointed out. The lower end of that canal (indicating) is 36 miles from Lake Michigan. It is 26 feet deep and 165 feet wide in the rock section, and 225 in the earth section.

Section 23 of the act provided that, if a canal were cut through the rocky divide, or the Continental Divide, it should have a capacity of not less than 600,000 cubic feet per minute, or 10,000 cubic feet per second.

You will notice here (indicating on map) a blue line, here towards the bottom. That is the old Illinois and Michigan

canal. And that has been entirely abandoned, replaced and supplanted by the new canal, as held by the Supreme Court of Illinois.

Now, in regard to this March 2, 1827 act, I want to simply refer to some of the things that transpired prior to the time that act was passed and after its passage, and while the State of Illinois was exercising its power under that act.

Mr. Justice Sutherland: Before you come to that, may I ask you this question about section 12?

Mr. Adcock: Yes, sir.

Mr. Justice Sutherland: Is it your contention that, unless the suit can be maintained under the provisions of section 12 it cannot be maintained at all?

Mr. Adcock: Yes, sir: That Congress provided the method for the removal of structures that had been put in navigable waters contrary to the provisions of sections 9 and 10 and other sections of that act.

Mr. Justice Sutherland: Well, could not the United States maintain a suit to prevent obstructions to navigation independently of that law?

Mr. Adcock: I do believe that with that act—I believe that it is shown by the passage of these acts that it was intended by Congress that this method should be followed. There may be a question as to that. I simply want to make the point, your Honor.

Mr. Justice VanDevanter: Well, suppose you did not have this provision that you have referred to, in the latter part of section 12; suppose it was not there: Would you say that no suit could be brought?

Mr. Adcock: No.

Mr. Justice VanDevanter (Continuing): To remove obstructions?

Mr. Adcock: No.

Mr. Justice VanDevanter: You think that is necessary in order to remove obstructions?

Mr. Adcock: I think they simply put it there in order to—

Mr. Justice VanDevanter (Interposing): You think they could not have brought a suit without that section?

Mr. Adcock: I believe they could have, under their general power—

Mr. Justice VanDevanter (Interposing): Now, they have not taken away the power to bring a suit against other things that are in violation of the act. Why do you say that this power does not exist?

Mr. Adcock: Well, merely this: That Congress under these acts has provided a plan by which these structures may be removed. For instance, under section 18 of the act which relates to the changing of bridges, there is no provision for an injunction. The only provision there is for a fine. And the Secretary of War must follow a certain procedure. He has got to have a hearing, and provide that the bridge shall be altered or modified—

Mr. Justice VanDevanter (Interposing): You are familiar with the *Elephant Butte* case, are you not?

Mr. Adcock: What is the name of it?

Mr. Justice VanDevanter: The *Elephant Butte* case?

Mr. Adcock: I do not recall it just now.

Mr. Justice VanDevanter: Well, it involved a dam in New Mexico and Colorado; and it was there found that one of the affluents of the Rio Grande River was being tapped and the water was being taken out.

Mr. Adcock: Do you mean the *Rio Grande Dam & Irrigation Co.* case?

Mr. Justice VanDevanter: Yes.

Mr. Adcock: I know that case, of course.

Mr. Justice VanDevanter: And the United States brought a suit to prevent that obstruction, on the ground that it was impairing the navigability of the river below, and that it affected also the ability of the United States to comply with its treaty stipulations with Mexico.

Mr. Adcock: Yes; I know that case; that is in the 174 U. S. reports.

Mr. Justice VanDevanter: They did not have any difficulty there about the right to bring such a suit, did they?

Mr. Adcock: That suit was brought under the act of 1890, the language of which is entirely different. It provided for the institution of a suit of that kind. And besides, that was as to a dam being constructed—which, as the court stressed in that case, was especially mentioned in the act of 1890.

Mr. Justice VanDevanter: Do you think the *Economy Light & Power Co.* case is consistent with your view?

Mr. Adcock: That was a dam across the water; and the only question there was whether it was a navigable water of the United States or not; that was a structure; the dam had been started; they had started to build it; and of course, if they could remove a part of the structure, certainly the court could enter an injunction which would prevent them going ahead and building the structure that had been started.

Yes, those cases were cited by counsel for the Government.

Now, I would like for just a few minutes to proceed in the consideration of this act of March 2, 1827. And that has a great deal to do with the early history of this country.

We have here (indicating) a map which shows the navigation of the Mississippi waterway system. This water route (indicating) extending from Chicago here, down across the Continental Divide, which was a very small divide (indicating), the Des Plaines and Illinois Rivers (indicating) and so on to the Gulf of Mexico (indicating)—is a very old plan.

And in the laying out of the Northwest Territory, under the cession of Virginia in 1783, and the Ordinance of 1787, the question of the development of this water route was under consideration; and originally the northern boundary of the lower three States in the Northwest Territory—that is, the territory that afterwards became those States—was a line drawn through the very southern end of Lake Michigan. When the Illinois enabling act was passed, the day it was passed it was amended to provide for the new state, the port here at Chicago (indicating on map) and a certain amount of territory back of it, in order to support that, and in order that the water route should be entirely within Illinois. And as it was stated in the resolution presented by Mr. Pope for the amendment of the enabling act in order to cover this additional territory, the fact that the water route was all within Illinois, would draw the attention of the State of Illinois to the development of the waterway.

Then in 1822, Congress passed the act of March 30, 1822, which was the first act of Congress with reference to the development of this waterway, which provided; the title of the act was as follows:

> "An act to authorize the State of Illinois to open a canal through the public lands to connect the Illinois River with Lake Michigan."

A portion of said act reads as follows:

> "That the State of Illinois be, and is hereby authorized to survey and mark through the public lands of the United States, the route of the canal connecting the Illinois River with the southern bend of Lake Michigan; and ninety feet of land on each side of that canal shall be forever reserved from any sale to be made by the United States."

Now, that act ceased to have any force and effect because there were certain things that Illinois was to do within a period of years, that it did not do. And in 1826 the Gen-

eral Assembly of Illinois memorialized Congress with reference to the construction of a canal and the importance of it.

On March 2, 1827, Congress passed another act, which had substantially the same title, and which provided:

> "That there be and hereby is granted to the State of Illinois, for the purpose of aiding the said State in opening a canal to unite the waters of the Illinois River with those of Lake Michigan, a quantity of land equal to one-half of five sections in width, on each side of said canal, and reserving each alternate section to the United States, to be selected by the Commissioner of the Land Office, under the direction of the President of the United States, from one end of the said canal to the other; and the said land shall be subject to the disposal of the Legislature of the said State, for the purpose aforesaid, and no other; provided, that the said canal when completed shall be and forever remain a public highway for the use of the Government of the United States, free from any toll, or other charge, whatever, for any property of the United States, or persons in their service passing through same."

Now, in 1822 and 1824, the government of Great Britain refused to the citizens of the United States the free navigation of the St. Lawrence River, and that question was not settled until the treaty of 1854.

I am referring to these facts with reference to the enabling act of Illinois, and the actions of Great Britain, to show the intention to construct a canal of a certain size, and to create and enlarge this waterway to the dimensions that the Government had in mind at that time.

On January 9, 1836, the State of Illinois passed an act under which the Illinois and Michigan Canal—the one I pointed out on the map, which extends down to Utica, on the Illinois River, about 100 miles—under which act that was built. Section 16 of that act provided that the canal should be of a certain width and should be supplied with water from Lake Michigan, and from such other sources as the canal commissioners might provide.

And in fact, Lake Michigan was the only place from which they could get water for the operation of the canal; and it was the only place for the upper section of the canal which could cross through the Continental Divide. And it also provided that there should be reserved on each side of the canal 90 feet, for the purpose of enlargement. And you will recall that the act of March 30, 1822—that is, the act of Congress, had a similar provision, that there should be reserved a certain amount for enlargement.

So we have the width of the original canal, which would be 45 feet—that is, the canal itself—and the amount reserved, 90 feet on each side, for enlargements, which would make a canal 225 feet in width.

The canal was completed in 1848; and at that time the diversion of water from Lake Michigan commenced. It was not completed, however, on the original plan, because of lack of funds, so far as the upper stretch was concerned. It was completed on what was called the "shallow cut plan."

In 1861, the General Assembly of Illinois authorized and empowered the canal commissioners to make a survey for the improvement of this canal—an improvement of the waterway. It was not only the enlargement of the canal, but also for the purpose of providing water so that the Illinois River would be made deeper and they would have depths there for navigation purposes—

Mr. Beck (Interposing): Mr. Adcock, would you mind explaining to the Court that this is not the canal that is in suit?

Mr. Adcock: I will come to that.

Mr. Beck: I do not want the Court to think that you are talking about the canal in controversy.

Mr. Adcock: No, I will come to that.

Mr. McReynolds: Is this canal in operation now?

Mr. Adcock: No.

Mr. Justice McReynolds: When was it abandoned?

Mr. Adcock: The canal is in operation from Joliet, this point (indicating on map) south to Utica. It is not in operation from Joliet north, because it has been supplanted by the Sanitary and Ship Canal that is here in controversy; and it has been entirely abandoned, and that has taken its place; and instead of maintaining the old canal, they build a new one right alongside it, which took the place of it, and was under the provisions of the 1827 act.

In fact, our organic act provided that we might occupy the site of that canal, if it were necessary; that is, if we desired to do it. But we did not do it, because it was cheaper to dig the canal alongside of the old canal than to build one on the site of the old canal.

Mr. Justice Sutherland: Well, did the act of 1827 fix the width of 45 feet, or did it make this additional grant of 90 feet on each side for the canal?

Mr. Adcock: No, it did not.

Mr. Justice Sutherland: What did it provide?

Mr. Adcock: It merely provided that a certain amount of land was granted to the State of Illinois, to construct a canal to unite Lake Michigan with the Illinois River. But the act of March 30, 1822, did provide that there should be reserved 90 feet on each side of the canal; and this act of 1827 was a reenactment of the old act of 1822.

Mr. Justice Sutherland: Did either act say anything about the diversion of water or the size of the canal?

Mr. Adcock: No. That was left, as we conceive, to the discretion of the State, to build a canal that it considered suitable for commerce, to be operated in such a way as it considered reasonable.

Mr. Justice Sutherland: Well, do you mean to say that that canal was 45 feet wide at that time?

Mr. Adcock: The act under which the canal was built, that is, the act of Illinois, provided that it should be not less than 45 feet wide, and that there should be reserved on each side 90 feet for enlargement of the canal.

Mr. Justice Sutherland: Was there anything provided about the depth?

Mr. Adcock: Yes, the Illinois act contained a provision as to the depth. I think it provided that it should be not less than six feet deep.

Mr. Justice Sutherland: Six feet deep?

Mr. Adcock: Yes, sir.

Mr. Justice Sutherland: And the present canal is of what depth?

Mr. Adcock: It is 26 feet deep. The idea there, I assume, is this: That if the canal is widened, it necessarily would carry a depth corresponding to the width, as commerce might require—

The Chief Justice (Interposing): Well, Mr. Adcock, in order to help us understand this as you go along, is it your contention that the United States is in a situation now where it may not deny nor prevent the taking of water from Lake Michigan for the purpose of building a canal?

Mr. Adcock: Our position is this: That the United States directly authorized us to build a canal; that there was no limitation as to how it should be built, the amount of water that should be taken—or, to put it another way, they invited Illinois to exercise its authority.

The Chief Justice: Well, you did build a canal?

Mr. Adcock: Yes, sir.

The Chief Jusice: Under that authority?

Mr. Adcock: Under that authority.

The Chief Justice: And now you are seeking to enlarge that authority by the fact of the original grant?

Mr. Adcock: No; we are simply acting under the authority, which we consider as a continuing authority, not only to build a canal which suited the demands of navigation at that time, but to maintain a canal across there which would suit the demands of navigation as they might afterwards appear. That is our proposition.

Mr. Justice Holmes: Which act are you referring to? Who do you say gave you that authority?

Mr. Adcock: Congress.

Mr. Justice Holmes: Did you say which act of Congress it was?

Mr. Adcock: The act of March 2, 1827.

And also, putting it another way, that under the act of 1827, Congress invited Illinois to exercise the authority which was reserved to it under the Constitution—that is, the police power to develop these waterways and use the canal for a waterway or for any other legitimate purpose.

Mr. Justice Brandeis: And your contention is that this grant is a preferential grant over the rights, whatever they may be, of other States, for navigation and other uses of water on the Great Lakes?

Mr. Adcock: Yes. That is, that it was granted in the interests of navigation.

Mr. Justice Brandeis: Well, I mean it was a preferential grant for navigation, so that it took precedence over any other uses that Congress might want to make of that water—or the States bordering on the Great Lakes?

Mr. Adcock: I do not think that we are in the position here, your Honor, where we take the position—or that it is necessary to determine the proposition as to what would happen if Congress should now occupy the field or exercise its power in regulating the amount of diversion for navigation purposes.

Mr. Justice Brandeis: That is, you could gradually, with the increasing demands of navigation and the size and draft of vessels—you could continue, at least until Congress otherwise provided, to increase your draft from time to time, regardless of its effect on the Great Lakes?

Mr. Adcock: So long as the acts of Illinois were reasonable and reasonably necessary for the purpose.

Mr. Justice Brandeis: Well, I mean for navigation through the canal down to the Mississippi?

Mr. Adcock: Yes, sir, so long as Congress permitted that.

Mr. Justice Sanford: Is it your contention that this increased taking of water is necessary for navigation purposes?

Mr. Adcock: It is our position, your Honor, that when the canal was provided for, that is, under the act of May 29, 1889, they had two propositions in mind—providing a canal for navigation purposes, as well as to take care of the sewage and protect the water supply. That at that time there was a demand for a deep waterway to the Gulf of Mexico, of 14 feet, and that the waterway could not be created without the diversion of water.

And I would like to refer, as I have just about come to that point, to what the United States Government did with reference to the size of a canal, with reference to a deep waterway and the idea of a diversion of water from Lake Michigan for the deep waterway; because it was necessary not only to build a canal of certain size for the increased demands of navigation, as they conceived it then, but also to provide water for the Illinois River. That is a never-failing water supply because at time of low water the flow of the Illinois River was practically nothing—from one to five hundred cubic feet per second—and this increase would give very great depth in the Illinois River, for the purposes of navigation; and this is what Illinois did in 1861—

Mr. Justice Sanford (Interposing): Was anything said in those later acts of Congress in reference to drainage, or was it merely a matter of allocation?

Mr. Adcock: No; this Court, speaking through Mr. Justice Holmes, in *Missouri* v. *Illinois*—and I think I might just as well read that here—said:

> "Some stress was laid on the proposition that Chicago is not on the natural watershed of the Mississippi because of the rise of a few feet between the DesPlaines and the Chicago River. We perceive no reason for a distinction on this ground. The natural features relied upon are of the smallest, and if under any circumstances they could effect the case, it is enough to say that Illinois brought Chicago into the Mississippi watershed, in pursuance not only of its own statutes, but also of the acts of Congress of March 30, 1822, and March 2, 1827."

And on that proposition our Supreme Court said, in the 272 Illinois, speaking through Mr. Justice Carter of that court—and that was a suit brought by a taxpayer to enjoin the construction of the Sag Channel, which is an adjunct of the main channel, and is located down here (indicating on map); and the court said:

> "Said act of 1903"—

That was an act that specially related to the Calumet Sag channel, and is not the act of May 29, 1889, which related to the main Sanitary and Ship Canal:

> "Said act of 1903 permits the crossing of the Illinois and Michigan canal near Sag bridge and provides for the abandoning of certain portions of said canal. Counsel for appellant argue that this is in violation of the Federal grant of 1822, under which the Illinois and Michigan canal was constructed, which provides, among other things: 'If said ground shall ever cease to be occupied by and used for a canal suitable for navigation, the reservation and grant hereby made shall be void and of none effect.' The canal was built under the authority of Congress of March 2, 1827, the act of 1822 having been mutually abandoned by the State and Federal governments. This Federal act did not provide

just where the canal should enter Lake Michigan, simply stating that the land was granted for the purpose of opening 'a canal to unite the waters of the Illinois River with those of Lake Michigan.'"

That is the one we call the "Sanitary and Ship Canal."

"The Sanitary District's main channel as now constructed practically complies with this act and furnishes a canal more suitable for navigation than the Illinois and Michigan canal. Furthermore, the Sag channel or cut-off is required to be navigable by said act of 1903, and the proof shows that the Calumet River is navigable to the point where it is intersected by the Sag channel. This cut-off would therefore also practically comply with both of said Federal acts as to furnishing part of the canal for connection of the Illinois River with Lake Michigan."

In 1861—referring to the resolution of the Illinois General Assembly with reference to the enlargement of this canal and enlargement of the waterway—it provided for a survey—

"of the different methods proposed or desirable for improving the navigation of the Illinois River, by dredging or excavation of the channel and wing dams, or by supplying water from Lake Michigan, through the enlargement and deepening of the Illinois and Michigan Canal, or otherwise, or by opening a channel from Lake Michigan by way of the South Branch of the Chicago River and Mud Lake to the DesPlaines River and down said Canal to a point that would secure a free, flowing, ample and never-failing supply of water, sufficient for navigation of the Illinois River at all seasons and times, * * * and to include also an estimate for the channel hereinbefore mentioned, of sufficient size to admit of full and free steamboat navigation from the Illinois River to Chicago and Lake Michigan, as well as a size sufficient for supplying water for all the deficiencies of navigation in the Illinois River, at all seasons."

The Chief Justice: What was the enacting body?

Mr. Adcock: Illinois.

The Chief Justice: The Illinois Legislature?

Mr. Adcock: Yes, the Illinois Legislature.

And President Lincoln, in his second message to Congress, in 1862—I think it was on December 1, 1862—recommended that this matter be considered, the matter of the enlargement of this waterway. So that they had in mind, not only the size of the canal, but a diversion of a quantity of water from Lake Michigan.

Now, following those—and we must have in mind also President Lincoln's message—in 1866, Congress provided for a survey of this waterway, with the idea of improving it. And General Wilson, who made the report in 1867, stated:

> "The Illinois River seems to have been especially designed by nature as the link by which the waters of Lake Michigan are to be connected with those of the Mississippi. * * * the data herein contained, together with the existence of a canal of limited capacity already in operation, demonstrate beyond a doubt that the waters of the Lake may be carried into the Illinois River through a navigable channel of any required dimensions, and at a cost which cannot be regarded as excessive when the objects to be obtained are duly considered. * * * The summit will be inexhaustible, and this cannot be said of any other practicable line of water communication between Lake Michigan and the Mississippi River."

In 1871, the Illinois and Michigan Canal was completed on the deep cut plan, by which water was taken from Lake Michigan by gravity—a greater amount than had been theretofore withdrawn.

And following that, a report was made by another engineer officer, in which he stated:

> "The improvement of the eastern portion of the Illinois and Michigan Canal involves the further cutting down of the summit level and enlarging the waterway so as to afford an unfailing supply of water from Lake Michigan for the improved Illinois River."

Mr. Justice Sutherland: What are you reading from now?

Mr. Adcock: That is in one of the reports. I am reading a quotation from my brief.

Now, there were a number of reports made by engineers pursuant to acts of Congress up until the very time that this act of May 29, 1889, was passed—all recommending that a large canal should be built across this divide to take water from Lake Michigan for the operation of the canal, and to supply water for the Illinois River.

On May 28, 1889, which is just one day before appellant's organic act was passed, the General Assembly of Illinois stated its waterway policy; that is, it was to provide a waterway of the greatest dimensions and to take water from Lake Michigan for its operation, in order to provide these needs.

Now, while all of this was going on and the canal was being enlarged for waterway purposes, the City of Chicago, which had a very rapidly growing population, used that canal in order to dispose of its sewage; that is, to partially dispose of it.

Of course, it did not divert from Lake Michigan all the drainage and sewage; but part of it was diverted. And Chicago cut down the summit level, so as to complete the canal on the deep cut plan, in order to cleanse the Chicago River.

And further, in 1883, the General Assembly of Illinois directed that Chicago should put in pumps at the northern end of this canal, in order to take more water in order to cleanse the river. The population was increasing, reaching almost a million people—with the sewage partially going into Lake Michigan. Typhoid fever was raging. In other words, we had 40 years ago, by reason of our population, the problem which Cleveland and Milwaukee only have today. Because of this aggregation of population, our water supply was polluted by virtue of the Chicago River flowing into Lake Michigan.

Consequently, the city council of Chicago appointed—or, under the authority of the city council of Chicago there was

appointed, a drainage and water supply commission, in 1886, to study the whole question of sewage disposal; and the protection of the water supply and the navigation features also.

That commission was to report not later than the next General Assembly, which was in 1887. They made their report on January 30, 1887, in which they recommended the construction of the diversion works which I have described to you here; that is, the very works which the Sanitary District has built in order to divert at all times the drainage and sewage from Lake Michigan.

The act was passed after very deliberate study; that is, our Sanitary District act. It was passed pursuant to this report of the commission. And it was pursuant to a study by the committee of the legislature which was to sit *ad interim*. The legal adviser of that committee was the late John P. Wilson, of Chicago; and Chicago went about to provide for this waterway—that is, the State of Illinois did in its legislation—and to provide at the same time for the disposition of the sewage and the protection of the water supply.

The day before this act was passed, Major Marshall, who was the engineer at Chicago, made a report, which is contained in the reports of the Chief of Engineers—and this will give you some idea as to how the United States considered this proposition, and the agitation that was then in existence as to a deep waterway from Chicago to the Gulf of Mexico. He stated:

> "Whenever the large channel contemplated by the City of Chicago for drainage is actually determined upon, in view of the fact that the channel for navigation and the channel for drainage across the Chicago divide must necessarily occupy the same field, it is evident that, to avoid duplication of expense, the channel, at least, in the expensive rock section, should be constructed based on the immediate requirements of navigation, while at the same time giving a sufficient flowage capacity to carry off the drainage of the Sanitary District."

And the act under which these works were constructed provided for these navigation features. It provided that when the canal was constructed it should be a navigable waterway of the United States, and that it should be of certain depth and velocity, etc., and not over three miles per hour, all of which was necessary for navigation.

Now, following immediately upon the passage of this act, the Sanitary District of Chicago was organized; and it was a special act; although general in scope, it was really in substance a special act. They immediately commenced the survey of this canal.

The reports of the Chief of Engineers for 1890 contained verbatim copies of our act. And each year thereafter those reports contain reports of General Marshall as to the progress of the work, the purposes of the canal, what we proposed to do, not only as to its size but the diversion of water and the amount which was fixed by the act specifically; that is, that in the rock section it should be not less than 600,000 cubic feet per minute.

On April 21, 1891, very shortly after the appellant's board was organized, it passed an ordinance which stated that they would enter upon, use, widen, deepen and improve the Chicago River and the South Branch and the West Fork, in order to make that river large enough to serve as a supply channel by which the waters of Lake Michigan should be taken through the rivers to the Sanitary and Ship Canal.

That resolution or ordinance was sent to the Secretary of War, and very shortly after that, in 1892, Congress passed the first act relating to the improvement of the Chicago River; and it is our contention in this respect that, as soon as Chicago started upon its plan of deepening and widening the South Branch and West Fork of the Chicago River, Congress then proceeded to make appropriations for the improvement of the Chicago River itself.

And in this connection, there was no work done by the United States in the improvement in the channels of those rivers, except in the Chicago River itself; the work in the South Branch and West Fork was done by the Sanitary District; the work went along together; and the work done by the Sanitary District connected with that done by the United States in the Chicago River.

I want to refer just a minute to the act of March 3, 1899, which contains a provision with reference to the improvement of the Chicago River and the cooperation going on between the United States and the Sanitary District, the appellant, in that improvement.

Mr. Kirby: Do you mean the act of Congress?

Mr. Adcock: That is the act of Congress, yes, of March 3, 1899. And this act, under which the *Tunnel cases* the *West Chicago Street Ry. Co.* v. *Chicago,* in the 201 U. S. reports, opinion by Mr. Justice Harlan, if I remember correctly. There is a provision in that act reading as follows:

> "Improving Chicago River, Ill.: For continuing improvement from its mouth to the stockyards on the South Branch and to Belmont Ave. on the North Branch, $113,000, in pursuance of the provisions of an act"—

No; this was the act of February 26, 1897, which I wanted to read first, which adopted the project reported by Major Marshall in his letter of August 9, 1893, which described the Sanitary District works, the diversion, and suggested the 21-foot improvement. Then the act of March 3, 1899, came right along following that, as follows:

> "Improving Chicago River, in Illionis: Survey and estimate of cost for a channel 21 feet deep from its mouth to the stockyards"—

that is, the Chicago River—

> "To the stockyards on the South Branch, and to Belmont Ave., on the North Branch, so far as may be permitted by existing docks and wharves, exclusive of cost

of removing or constructing bridges or piers or lowering tunnels; and the aforesaid depth of twenty-one feet is hereby adopted as the project depth for the improvement in lieu of that fixed by the Act of June third, eighteen hundred and ninety-six: Provided That all the work of removing and reconstructing bridges and piers and lowering tunnels necessary to permit a practicable channel with said depth to be obtained shall be done, or caused to be done, by the City of Chicago without expense to the United States."

Mr. Justice Holmes: What page is that?

Mr. Adcock: This is page 107 of our reply brief.

Now, it was held in the *West Chicago Street Ry.* case that I have just mentioned, where the suit was brought by the people to remove the tunnels, that the consent of the Secretary of War to the removal of the tunnels was unnecessary, because Congress had meant to give its assent by this act.

Now, the proviso refers to tunnels, or one of the things referred to is tunnels. It was also necessary, as stated in the proviso, to reconstruct bridges; necessary to excavate about 21 feet, and to widen the rivers, in order to make the channel correspond to the greater depth.

And when the work was done, that is our work, in the South Branch (indicating on map) and in the West Fork (indicating), where we deepened the river to twenty-six feet and widened it and changed the bridges—it was all under the authority—or, at least, not necessarily express authority, but certainly with the cooperation of the Federal Government; because they had laid out the project for that depth; we did the work and spent the money, over $10,000,000, and connected that work with their improvement in the Chicago River. They made no expenditures, or made no improvements in the South Branch or the West Fork. The only improvement made by the Government, which was done as we excavated in the South Branch of the West Fork, was in the main river itself, and in the North branch. So that the im-

provements by the Sanitary District of Chicago connected up; and they connected up with the Government work, forming a through connection through the South Branch, the West Fork, and the main channel down to Joliet, and on the old Illinois and Michigan Canal, through the Illinois River, to the Gulf of Mexico.

So that our channels and the work that we did was certainly under those circumstances invited by the Federal Government.

And that was the very act—this item that I have read was contained in the Rivers and Harbors Appropriation Bill which contains this section 10 that we speak of.

Now, is it not reasonable to assume that this great work having been completed at that time, and that act passed, that if it had been intended that the amount of water that Chicago should divert for these purposes should be curbed, then some express words would have been used?

Now, going on, there have been some acts which provide for surveys of this water route. And in one of them, that of June 6, 1900, we find this language, which I think is very important, that a board of engineers should be appointed to make a survey of a waterway and report the estimate of cost for a channel ten feet deep, and for a channel twelve feet deep, and for a channel fourteen feet deep, "through said proposed route, and that the said estimates cover and include a proper connection at Lockport with the Sanitary and Ship Canal which has been constructed by the Sanitary District of Chicago."

In other words, with the idea of connecting right up with that.

Now, there are many other acts, which are set forth in our briefs, passed almost every year, providing for these surveys, providing for reports as to the construction of compensating works in the various river outlets of the Great Lakes, in order to offset for any claimed damage to commerce, or offset for

the lowering of the levels of the Lakes. All of those were provided for.

And we come further to the act of June 29, 1906, for the preservation of Niagara Falls; and I would like just for a few moments to draw your attention to that, because I think it is important. That act provided—it is found at page 51 of my brief:

> "That the diversion of water from Niagara River or its tributaries, in the State of New York, is hereby prohibited, except with the consent of the Secretary of War as hereinafter authorized in section two of this Act: Provided, that this prohibition shall not be interpreted as forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States under its direction."

In other words, we have there an act of Congress which expressly, it seems to me, states that Congress had not then authorized the Secretary of War to regulate diversions. If it had, there would have been no occasion for the passage of that act, because the Secretary of War could have stopped the diversions, as Congress intended that he should under that act at Niagara Falls. And up to that time the diversions at Niagara Falls for water power purposes, for the making of electricity, existed solely and only under the authority of the State of New York. They were in no different position than the diversion here for sanitary and waterway purposes at Chicago. They existed under the police power of the State, and under that alone.

And in the conference report, when there was an amendment that had been introduced, the late Senator Lodge, in discussing an amendment that Senator Hopkins of Illinois had offered, said:

> "The first section of the bill protects the rights of Chicago. No treaty would be made by our commissions which would impair or infringe those rights."

In other words, even in an act which only related to the Niagara River in New York, Congress was so careful that that should not by any possibility be construed to cover diversions for sanitary and domestic purposes, that it put in the provision that the act did not give the Secretary of War any authority, but those things might be taken care of by Congress later.

I wonder just how much time I have left, if your Honor please?

The Chief Justice: You have, I should say, about ten minutes left of your two hours.

Mr. Adcock: Yes. The importance of these acts that I have just mentioned, running over this period of years, shows that there was an intention on the part of Congress to provide means by which this diversion would exist.

Under the act of June 25, 1910, a board of engineers was appointed to report upon a waterway from the Great Lakes to the Gulf—

The Chief Justice (Interposing): Yes; that is just what you have consumed now, an hour and fifty minutes.

Mr. Adcock: Yes, thank you. (Continuing): To report upon compensating works to offset for the diversions for water power purposes and for other purposes.

That is, they were to make a report on the waterway from Lockport to Utica; and they were also to report upon the means by which the levels of the Lake, or the lowering of the lake levels, could be offset by the construction of compensating works in these outlets, not only for waterway purposes, but for other purposes. And they made their report. And they found in that report that, by building contracting works in the St. Clair River and the Niagara River, the channels of these rivers could be so contracted that the lake levels could be restored to the conditions in which they would be if the diversions did not exist.

On June 30, 1917, Congress by joint resolution again provided for a survey as to means of taking care of all diversions. This is not the only diversion from the Great Lakes. There are some 112,000 cubic feet per second of diversion for water power purposes. There are only 2,300 cubic feet for navigation purposes. The Niagara diversions are for power purposes. There are diversions through the Welland Canal of 3,500 seconds feet, 2,400 seconds feet for power and only 1,100 feet for navigation. Through the Barge Canal there are diversions for power and navigation purposes. And at St. Mary's River, practically the entire flow of that river is used for water power.

Mr. Justice Sutherland: The water is all returned to the stream, is it not?

Mr. Adcock: Yes; but at Niagara Falls there is an effect upon Lake Erie; and also by virtue of the Welland Canal diversion, and as I understand it, the diversion by means of the Barge Canal—

Mr. Justice McReynolds (Interposing): What is the Barge Canal?

Mr. Adcock: It extends from Buffalo across to Albany; it is the New York Barge Canal, as I understand it.

Mr. Justice McReynolds: Oh.

Mr. Adcock: Does that place it in your mind?

Mr. Justice McReynolds: You mean the Erie Canal?

Mr. Adcock: Well, it is the old Erie Canal, yes, sir. It has just been constructed.

Mention has been made of the navigation features of the Sanitary District. These works that have been constructed will provide a waterway to the Gulf of Mexico with a depth of nine feet. They will provide water in the Illinois River, so that there will be a greater depth. We have a water communication twenty-six feet deep—the United States has, from Lake Michigan, clear to Joliet, across the most expensive cut.

And from a sanitary standpoint, the diversion of this water has accomplished a great deal. The death rate from typhoid fever prior to the opening of the canal has sometimes been as high as 170 per 100,000 of population. That has been entirely cut down. There are no epidemics now; and for the ten years since the building of the canal the mean average per year has been in the neighborhood of 7.6 per 100,000 of population. That has been reduced so that in 1923 it was about one per 100,000 of population—a decrease greater than for any other city similar situated. Of course, it is not assumed that the entire result was due to this drainage canal.

Mr. Justice McReynolds: Suppose all of that is true, what good does that do us?

Mr. Adcock: It just shows the necessity for this diversion.

Mr. Justice McReynolds: Well, you might show the same thing about inoculation; and I was just wondering how that would help us in deciding this case.

Mr. Adcock: Now, the propositions which I sought to show here, but which I am not even able to cover in the oral argument, but which I think are covered in our briefs, are these:

This diversion of water has been authorized by the act of March 2, 1827, so that it is affirmatively authorized by law; Congress. And it has been affirmatively authorized by law; because section 10 of the 1890 act, instead of containing the words "affirmatively authorized by Congress," contains the words "affirmatively authorized by law"; and in the case of *Bellingham Bay Boom Co.*, it was held that that meant a State act.

Mr. Justice Holmes: What was that last act that you cited?

Mr. Adcock: That was the act of September 19, 1890.

Now, assuming that section 10 authorizes the Secretary of War to act with reference to this diversion—we will concede it does, so far as the diversion affects the Chicago River:

We contend that we have fulfilled every condition of the permits that have been given by the Secretary of War. That is, we have so reconstructed river so that there is no injury to navigation. There is no current. The Government has never complained in that respect.

That under the July 11, 1900, permits, for the excavation of those rivers, which permits were given for that purpose, the only purpose of excavating was to provide this larger diversion, so that we could take the amount of water required by our act through the rivers; and we contend that necessarily, when the Secretary of War, upon the recommendation of the Chief of Engineers, authorized the doing of that work, he gave authority for the altering or modifying of the navigable waters of the United States, not only in the Chicago River, but wherever located, and strictly in accordance with the provisions of section 10 of that act; that is, laying aside all questions as to the provisions of the act of March 2, 1827, as to the limitations of our law, and as to the authority under the reserved power of the States, the Congress of the United States has invited the construction of these works.

And there is no evidence in the record,—as stated by Mr. Justice Holmes in the case of *Missouri* v. *Illinois*, all the evidence of the Government in this case for an injunction is based upon an inference of the unseen; there is no evidence that the levels of the lakes have been affected or lowered, or that there has been an injury or damage to commerce.

Now, it does not make any difference what legal right the Government has here, there cannot be an injunction which will take effect immediately and without condition. Because it would create an intolerable situation at Chicago. The people, the appellant, the municipalities within appellant's district, that is, the City of Chicago and all the other municipalities taking water from Lake Michigan depending upon these

diversion works for their pure water supply, must have time in which to readjust themselves.

The Chief Justice: What is the exact order?

Mr. Adcock: That the appellant be enjoined from diverting or abstracting from Lake Michigan any water in excess of 4,167 cubic seconds feet.

The Chief Justice: And how much are you taking now?

Mr. Adcock: Ten thousand seconds feet. It is perfectly obvious that if it was cut down to 4,167 second feet there would be no water for the oxidation of sewage. The drainage run-off the Chicago River is 10,000 cubic seconds feet. That is the maximum run-off of the Chicago drainage area, being that amount, would cause the Chicago River to go into Lake Michigan a number of times a year, and carry with it the drainage and sewage, if this diversion were kept within that amount.

The Chief Justice: Well, you concede, then, that you have no express authority from the Secretary of War beyond the 4,167 feet?

Mr. Adcock: No. We claim that we had express authority. If you want to look, the authority exists under the July 11, 1900 permits—well, I want to say that perhaps I did not quite understand the Chief Justice's question. That is, we have not any express authority stating 10,000 seconds feet, or any amount over 4,167 seconds feet. The only authority we have is the authority under the original permit—that is, so far as permits go—from the Secretary of War. And we have fulfilled all the conditions of those permits. That is, the only condition that he placed in the permit was the current in the Chicago River. And we have done the things in the channel of the Chicago River that were necessary to remove any current that would exist by virtue of taking 10,000 cubic seconds feet through those channels. So that, so far as that permit is concerned, we have complied with it.

We have done the work in the deepening and widening of the rivers under the permits of July 11, 1900. And that was the only work that was necessary in order to take our water through there. We had to do it; and unless we did that work we could not get the water through. And it was the purpose of the work; and having given us authority to do the work, he necessarily gave us the authority to do those things which would result from the work.

Mr. Justice Butler: How many intakes are there?

Mr. Adcock: There is a channel here (indicating on map) at the northern end, north of Chicago, at Wilmette, which connects with the North Branch of the Chicago River. Then there is the Chicago River itself. And there is a conduit at 39th Street, which picks up, by intercepting the sewage along the shore 2,000 feet; and then there is this Calumet Sag Channel (indicating).

Mr. Justice Butler: That is four, is it?

Mr. Adcock: No, that is 6,500 coming through the main river—

Mr. Justice Butler (Interposing): No; I mean four intakes?

Mr. Adcock: There are five.

Mr. Justice Butler: And one under construction further north?

Mr. Adcock: No; there are none under construction now.

Mr. Justice Butler: You have completed all of them?

Mr. Adcock: We have completed our diversion works.

Now, we have a plan or provision made for taking care of the sewage that will not be oxidized by this 10,000 seconds feet. But the basis of the whole thing, of the whole proposition, is the diversion from Lake Michigan of 10,000 seconds feet, in order to keep the Chicago River and all its branches supplied with sufficient water for those purposes.

Mr. Justice Brandeis: What other means have you adopted to take care of the sewage?

Mr. Adcock: We have put in sewage purification works to supplement that diversion; but they are only supplemental.

Mr. Justice Brandeis: Where are they?

Mr. Adcock: Those are the various projects that are laid out (indicating on map); and it is shown in the testimony—

Mr. Justice Brandeis (Interposing): What proportion of the present sewage of the city will be taken care of by those works?

Mr. Adcock: Those works will be installed by 1945, under an ordinance adopted August 7, 1919; and that ordinance was passed in cooperation with the United States Engineer at Chicago, and it is to take care of the increase of the population in that period.

Mr. Justice Brandeis: In the next twenty-one years?

Mr. Adcock: In the next twenty-one years; and also the waste, etc., that now overloads the channel.

Mr. Justice Brandeis: Is there at present an overload?

Mr. Adcock: Yes, sir.

Mr. Justice Brandeis: How much is the overload, in comparison with the capacity of the channel?

Mr. Adcock: Well, it creates a condition in the Illinois River that is bad. It is due principally to trade wastes that have to be taken care of.

Mr. Justice Brandeis: How large is that overload, estimated in percentage?

Mr. Adcock: About fifty per cent. It represents all the sewage of about a million and a half people.

Mr. Justice Brandeis: And is it the impossibility of producing these supplemental works before the end of twenty-one years that leads to their being deferred until 1945?

Mr. Adcock: No. In order to work out this project—the art of sewage disposal, if you can call it an art, has been in a state of flux or change for a great many years; and one method would be adopted, only to be thrown away for some other method; and it has required—

The Chief Justice (Interposing): In the meantime, you have opened the exit from Lake Michigan?

Mr. Adcock: Yes; but the studies of these methods have been going on all the time, and it has been assumed—

The Chief Justice (Interposing): It has been done on the theory that you needed the water?

Mr. Adcock: On the theory that we had to have the water, and that it is absolutely necessary for the disposal of the sewage.

(Thereupon, at 4:30 o'clock p. m., the Court adjourned until Tuesday, December 9, 1924, at 12:00 o'clock noon.)

SECOND DAY.

Washington, D. C.,
Tuesday, Dec. 9, 1924.

The above-entitled cause came on, for further oral argument, before the full Court, at 12:00 o'clock noon.

Appearances as heretofore noted.

Oral argument of Daniel N. Kirby, Esq., amicus curia, in favor of appellant.

Mr. Kirby: May it please the Court: On behalf of my associate, Mr. Lynde of Chicago and myself, I desire to express our appreciation of the courtesy of the Court in permitting us to participate, and of the courtesy of the parties to the record in consenting.

We are here representing the States of Illinois, Missouri, Tennessee and Louisiana; also various chambers of commerce and boards of trade in the cities of Chicago, St. Louis, Memphis and New Orleans. We also represent the Mississippi Valley Association, an organization whose membership includes shippers, persons interested in navigation, extending from St. Paul to New Orleans, and who therefore, in their interests, represent the whole of the Mississippi Valley. So it may fairly be said that we represent the people and commerce of the Mississippi Valley.

The Mississippi Valley is interested in this decree and in its effect, from two points of view, and for two reasons: *First*, in respect of navigation in the Mississippi Valley; and *second*, the question of sanitation as affecting the State of Missouri, particularly, and the State of Illinois directly.

As to navigation, the primary interest of all of the Mississippi Valley is, of course, for the improvement and the direct use of the Mississippi River and of this historic highway from the Lakes to the Gulf, for the purposes of navigation and commerce.

This decree, we submit, will prejudice the navigability of the Mississippi River itself, if it should be put into effect. The extent to which the navigability of the Mississippi River is prejudiced will appear from the fact that the low water flow of the Mississippi River at St. Louis—and low water time is the critical period of navigation of the Mississippi River—the total flow is only 33,000 cubic feet per second, including this 10,000 cubic feet which is obtained from Lake Michigan.

Now, if this decree goes into effect and more than half of that added water taken from Lake Michigan should be taken out of the Mississippi River, the effect upon navigation between St. Louis and Cairo, Illinois, which is the critical part of the river, will be seriously impaired.

The navigability of the Mississippi River and the supply of water for navigation in that stream has become lessened through the effect of the drainage of swamps in the sources of the tributaries of the river in the far north; so that the critical time in the navigation of the river is becoming more and more a problem of difficulty to the engineering department of the United States.

The secondary interest that these Mississippi Valley States have in this question of navigation is due to the fact that, because of the revived interest in navigability of the Mississippi River due to the Government's cooperation since the war in creating and operating a barge line from St. Louis to New Orleans, which carries vast quantities of freight now between those two points; a single barge load of grain carrying as much grain from St. Paul to the Gulf as a whole trainload of freight cars. It has revived interest of the whole Mississippi Valley in the navigability of the inland waters and in the promotion and further carrying out of the project, which has been under contemplation and consideration by the Government for many decades, and that is the project for a deep waterway from the lakes to the Gulf.

Now, the existence of an available, an actual, route by water, not only from the cities and towns immediately upon the Mississippi River and its tributaries that are navigable, but available for part rail and part water routes, extends the influence of this decision not only to the immediate Mississippi Valley and to its navigable tributaries, but all over the West, so far as the rail lines reach, over which, in conjunction with this water route, there are available combination rail and water rates, and the existence of this available water route from St. Louis, or from a point higher on the Mississippi, to the Gulf at this time has the effect of a leveling and lowering influence upon the rail rates to the Coast from all of these shipping points in this vast territory that may be called the "Mississippi Valley freight territory,"

and the trade territory tributary to the Mississippi Valley itself.

So that, in respect of navigation, these States and people are vitally interested in the question whether the navigability of the Mississippi River and of this proposed waterway and of this historic waterway between the Lakes and the Gulf, is going to be seriously impaired by the effect of this decree.

Next, the State of Illinois, in respect of sanitation, is directly interested, because this record shows that, if the flow, taking into consideration the increased population of Chicago and the increase in its surface waters and sewage—because of the increase in population and industrial consumption and use of water, which tends to poison it—if that flow of 10,000 cubic feet per second be cut down more than one-half, as this decree would do, why, then, the record shows that a condition of very grave menace to the health of the people of Chicago, and all the communities along the canal, the DesPlaines and Illinois Rivers, will be seriously threatened.

Of course, we in Missouri, and in St. Louis particularly, under the decision of this Court in *Missouri* v. *Illinois*—if we must fall heir to the sewage of Chicago in our drinking water, we are vitally interested in the question of sanitation, to the extent that the water that comes from Lake Michigan shall be adequate to safely dilute that sewage so that it will not be a menace to the health of the people of St. Louis.

The States lower on the Mississippi River are not immediately interested in that question of sanitation, because, by processes of nature, the water probably becomes purified.

With these interests and these peoples, and this vast extent of territory to be prejudiced by this decree if enforced, we have examined this record, and we respectfully submit that it presents a very narrow issue, as a matter of law. This

is not a suit by the Government to abate a public nuisance. It is not a suit by the Lake States, or any of them, complaining that the State of Illinois, as part owner of the waters of Lake Michigan, is making an unfair, unjust or inequitable use of those waters, to the prejudice of the Lake States.

Nor is it a suit by the Government of the United States, based on the general ground that the State of Illinois is making an undue or unreasonable use of navigable waters within its own borders.

The sole basis of these bills, your Honor, is that they rest upon the charge and the legal theory that any diversion of waters from Lake Michigan by the State of Illinois is unlawful, unless it be authorized by the Federal consents prescribed by section 10 of the Rivers and Harbors Act of 1899.

Now, that obviously brings before this Court, as the first question for legal consideration, the very important question of the sovereign power of the United States, and of Illinois, in respect of what Illinois has done in relation to navigable waters within her borders. Because it should be remembered that even Lake Michigan is wholly within the United States. No part of Canada borders on Lake Michigan; that all of the work that Illinois did, either directly through its own State expenditures of money, or through this subordinate agent of Illinois, has been done upon the navigable waters of the United States, wholly within the borders of the State of Illinois. That is, the work directly affecting waters of the United States within the borders of the State of Illinois.

Now, if the Court please, Mr. Adcock did not have time yesterday to state *seriatim* to the Court the legal propositions on which the Sanitary District and the State of Illinois, and this side of this great controversy, rest in this case. And they have asked me if I would read to the Court, or state to the Court, *seriatim*, what those propositions are, so that before the Government counsel make their arguments, the Court will have before it, in a connected and complete form

what these legal questions are, and what the contentions are; and to the extent that my time permits, I shall endeavor to deal with one or two of what I regard as the more important of these questions.

> "Proposition 1: The action of Illinois in providing for the diversion of water for navigation and sanitary purposes was valid, in the absence of any Congressional action."

In other words, our contention is that this case falls within the class of cases designated by this Court in many of its decisions as of the concurrent jurisdiction class, rather than within the class of cases wherein the legislative jurisdiction is exclusively vested in Congress.

In other words, until Congress acts, under the decisions of this Court in the concurrent jurisdiction class of cases, we understand the law to be firmly established that the State is free to exercise its sovereign power to use navigable waters within its borders, by bridging them; by building dams in them; by appropriating and diverting those waters for the public benefit of the people of the State; unless and until Congress shall step in with its superior power and interfere or regulate what the State has thus attempted to do, in the absence of Congressional action.

> "Proposition 2: Upon the entrance of Illinois into the Union, Congress recognized Illinois' authority to divert the waters and invited it to divert the waters."

Mr. Justice Sutherland: Will you not read that again, Mr. Kirby?

Mr. Kirby: Yes, your Honor:

> "Upon the entrance of Illinois into the Union, Congress recognized the authority of Illinois—"

Meaning its State sovereign authority—

> "to divert the waters of Lake Michigan into the Mississippi watershed, and it invited Illinois to do so."

This contention is based, *first,* upon what Mr. Adcock read to your Honors yesterday as to what happened in Congress when Illinois was admitted.

The resolution in its original form for the admission of Illinois into the Union did not contemplate including within the borders of Illinois any of Lake Michigan. But upon the floor of Congress an amendment was offered on the same day that the act of admission was passed; the effect of that amendment being, so far as this case is concerned, that in order to invite the attention of this new State just being admitted into the Union to the desirability of opening a waterway to connect the water of Lake Michigan with those of the Illinois River, it would be well to give Illinois as a part of her territory some of Lake Michigan; and that was done; the amendment became a part of the act of admission.

So that when Congress took the State into the Union, there was that invitation to look into this matter of the waterway; an invitation to the State to exercise its sovereign power in that regard.

Again, in 1822—Mr. Adcock read to your Honors the act by which at that time Congress more definitely expressed the same desire; because then it made a grant of land to the State of Illinois for the purpose of assisting the State in opening this very canal, the stated purpose of which was to unite the water of Lake Michigan with those of the Illinois River.

And again, the act of 1822 having become void because Illinois could not carry it out, the act of 1827 was passed, expressly in terms for the purpose of aiding the State of Illinois to unite the waters of Lake Michigan with those of the Illinois River.

And what did that mean, your Honors? What was necessarily implied in that? It was the recognition by Congress, we submit, of the fact that Illinois had sovereign authority as a sovereign State to act in respect of navigable waters

within its own borders, unless and until Congress should interfere. And in aid of that State power, Congress said in this act of 1827:

> "We will give you land that you can sell for the purpose of enabling you to carry out this State work and this State plan, which we invite you to engage upon involving these waters."

What would a Union of those two bodies be? Necessarily, it meant a diversion of water from Lake Michigan into the Gulf of Mexico, because the Gulf was lower in level than Lake Michigan.

The Chief Justice: Do you think Congress would have the power to delegate or give away its control of navigation, by legislation which should bind Congress not to restrict the taking of water which might interfere with navigation?

Mr. Kirby: No, your Honor, I do not think Congress could give away the power granted it by the Constitution under the Commerce Clause.

The Chief Justice: And if not, then the arguments here are only arguments with reference to its purpose, and therefore, there is nothing to prevent Congress from restricting it. Now, Congress has restricted it, has it not, in section 10 and section 12 of the act?

Mr. Kirby: We think not your Honor. We do not think that section 10 or section 12 of this act intended at all to delegate from Congress to the Secretary of War, especially when the Secretary of War could act only on the recommendation of the Chief of Engineers, the broad power to say that a diversion of Lake Michigan might be made into some other watershed. Congress never intended to delegate any such power. We think there are powers delegated there, and that they are powers appropriate to be delegated, and that they have delegated them in a constitutional manner. But we think that if the act is sought to be interpreted as making a wide delegation of power on questions of public policy, as

the question of your Honor intimates, such a delegation would have been unconstitutional, because Congress did not attempt to prescribe any general principles, or any rules subject to which the Secretary of War should determine the questions—the very questions affecting the public policy and the international controversies that might follow from the delegation and the exercise by a delegated administrative officer of such broad legislative powers as those involved. We think that section 10 has a very useful and a very wide scope. And I shall not have time to discuss it more, because I would like, if the Court will permit me, to cover these points in this statement.

The Chief Justice: Go right ahead.

Mr. Kirby: But that is our attitude about section 10 of the act.

The next proposition is—

> "That Congress has continually cooperated with Illinois over the long period of years since the 1827 act was passed; and it has never yet indicated its disapproval of this diversion, and has never yet attempted to either stop this diversion or to regulate it."

The next proposition is—

> "The Congress, by its attitude and action, has approved what Illinois has done in opening this canal and conducting this diversion of water from Lake Michigan, by repeatedly appropriating and expending money to help complete the work in the Chicago River and connect with appellant's channels."

In the decision of this Court in *Chicago Street Ry. Co.* v. *People*, in 201 U. S., it was held that the work thus provided for could have been completed and carried out without the permit. And that was the ruling of this Court.

In other words, there exists in this case a direct assent or consent of Congress itself, this Court held in that *Street Railway* case in Chicago, the subject of which was the lower-

ing of some tunnels that ran under the Chicago River and were used for street railway purposes; and in that case the permit of the Secretary of War had not been obtained for the doing of the work—this Court held that it was not necessary, because the consent of the Congress had been directly given for the doing of that work, and all that was reasonably to be implied from that consent went with the consent.

Mr. Justice Holmes: I remember a case of that kind, but I do not know the citation.

Mr. Kirby: That is in 201 U. S.

Mr. Justice McKenna: You did not give the page?

Mr. Kirby: No, I did not. I have not the page here.

My next contention is:

> "That section 10 of the Rivers and Harbors act of 1899, which is the act on which these bills are founded, cannot be construed to delegate to the Chief of Engineers and the Secretary of War authority to fix the quantity of water that may be diverted."

In other words, if the Sanitary District now went to the Secretary of War and the Chief of Engineers with a new proposal to divert from Lake Michigan through a small river into the Mississippi Valley, the contention is that the Secretary of War was not intended by Congress to have the power to determine whether a diversion could or could not be made, his power being limited to certain administrative features relating to the method in which the work could be done; and that that construction of the act appears more strongly from the fact that the approval of the thing through the Secretary of War must originate with the Chief of Engineers; that what Congress had in mind was that any work proposed to be done which would affect the navigable capacity of the waters of the United States should be so done, as to its manner of construction and the laying out of the work, and all of the engineering features affecting the method of doing that work,

as would be in harmony with the policy and plans of the engineering department in respect of the navigable waters of the United States and their improvement and whether the proposed work would prejudice their navigability. In other words, that the proper construction, and the only lawful construction, the only constitutional construction that may be given to section 10 of the act is that it is administrative in nature and narrow in scope, for the purpose of protecting the engineering features of work which is to be done.

Mr. Justice Sanford: Would you say that they could not provide for the limiting of the amount of water taken, in so far as it affected the navigability of the river by the Secretary of War?

Mr. Kirby: Certainly; but not to determine the broad question.

Mr. Justice Sanford: And that these permits were strictly in exercising that power?

Mr. Kirby: Certainly, that is it; that is a matter affecting the engineering features.

Mr. Justice Brandeis: Why is not the navigability of the lake and of the harbors at the lake ports also an administrative question?

Mr. Kirby: I think it would be, your Honor, so far as the channels into the lake are concerned.

Mr. Justice Brandeis: Well, according to the testimony, the depth of the harbors was affected by this diversion?

Mr. Kirby: But the United States itself did the work of the deepening of those harbors, so as to cooperate with this diversion of waters.

Mr. Justice Brandeis: Well, then, why should not the amount of the deepening necessary to preserve navigation be a matter which the Secretary of War could determine?

Mr. Kirby: I think the matter of the deepening of the channel itself would be a matter that would properly fall under the jurisdiction of the Secretary of War and the Chief of Engineers. But the fundamental question whether Illinois is to be allowed to divert or not is a different question—

Mr. Justice Brandeis (Interposing): No,—how much; not whether it can take, but how much is proposed to be taken?

Mr. Kirby: Yes. But in the act of 1827, in which there was no limit of the amount of water that was to be diverted in order to accomplish this union of the waters of Lake Michigan with those of the Illinois River—what is the reasonable construction that the parties themselves have put upon the depths and the effect of the development of navigability of those waterways? The diversion by the State of Illinois actually began in 1848. There was diversion then, but it was under gravity flow, and gravity flow could not accomplish the purpose, because there was no cut through the divide; the cut was not deep enough.

In 1871, they cut the channel deeper, from 1871 on, with never a protest from Congress, with never an objection from Congress to the continuation of such diversion, Illinois has continued, either directly or through this Sanitary District, to divert water—what quantity? Such quantity as Illinois, under its own statutes, declared to be reasonable and necessary. For what purposes? For two purposes: *First*, for sanitation, which was an entirely proper subject for Illinois to use these waters for—for protecting the health of its own people.

And *second*, for navigation. And navigation was not a mere incidental, because what money that Illinois spent and the work it did was in harmony with the very plans and projects of the engineering department for the development of this deep waterway proposed to be built between Chicago and the Mississippi River.

Mr. Justice Brandeis: What was the largest diversion up to the time when this 4,000 feet was authorized?

Mr. Kirby: 60,000 cubic feet per minute. That is all that the old Illinois and Michigan canal would take, as I understand it. The cut through the divide would only permit that much. That quantity—while that began in 1871, when the deep cut was first made, it diminished, through the gradual decrease of the water supply and the lowering of the level of the Lakes that occurred about that time; there is no charge that it was due to this diversion.

But this whole present diversion we claim is a lawful diversion, and a continuation of the diversion of the old Illinois and Michigan canal, and not, as the Government claims, a new diversion beginning with the present ship canal. This entire diversion began in a small way. Chicago was small. The needs of navigation were small. As the States grew and as the needs grew, they had to increase it for both purposes; there is no doubt about that. It might be conceded that sanitation was the primary purpose, but it was a lawful purpose.

The Chief Justice: Do you mean it was the primary purpose of the act of 1827?

Mr. Kirby: Oh, no, your Honor.

The Chief Justice: Well, is there anything in that act that indicates that sanitation was any purpose?

Mr. Kirby: No, your Honor; we suppose that Congress would have no power to grant for sanitation purposes to the State.

The Chief Justice: Well, but it has power to give permission for changing the level of the Lake?

Mr. Kirby: Yes, sir.

The Chief Justice: And if that was for sanitation, then I should say that the power to restrict would follow, in the interest of navigation?

Mr. Kirby: Obviously, the act of 1827 could deal only with such power as Congress had under the Commerce Clause, and that related to navigation.

The Chief Justice: Well, it has control over navigation; and the right to control navigation can be exercised by restricting the use for sanitation, or granting the use for sanitation?

Mr. Kirby: If the use for sanitation prejudices navigability, yes, your Honor. There is no charge of that kind in this case. This case rests entirely on the proposition that in lowering the Lake levels—that any diversion of water from Lake Michigan will necessarily lower the lake levels.

The Chief Justice: Well, it may.

Mr. Kirby: Yes; it will, appreciably.

The Chief Justice: Well, even though it affects sanitation, it affects navigation, and brings it within the power of Congress, does it not?

Mr. Kirby: Yes; but our contention is that Congress has expressly assented to that use of the waters of Lake Michigan.

The Chief Justice: In what way?

Mr. Kirby: By this act of 1827, for the purposes of navigation it has permitted the diversion. It wanted to unite those two bodies of water—to divert enough water from Lake Michigan to create a waterway available to meet the needs of the growing communities that might call upon it for use as the country develops. And Congress has never interfered with that, unless this Court shall construe this section 10 of the act of 1899 as intended to be an interference.

Mr. Justice Sanford: Do you mean to say that you are only removing so much as is necessary for navigation, and not for other purposes?

Mr. Kirby: Well, I will not say that, your Honor.

Mr. Justice Sanford: Then that consent will only extend to that which you are authorized to do, and for the purpose for which you are authorized to do it?

Mr. Kirby: Very true.

Mr. Justice Sanford: Now, if there is more than that done, how does it come under the consent?

Mr. Kirby: It does not come under the consent, except to this extent: That Congress knew perfectly well, and it is indisputable from the evidence in this case that it knew perfectly well, that Illinois, in its own sovereign power, was proposing to use it for the other purpose as well; and it has never interfered; but that on the contrary Congress was, in the act of 1827, and by a consistent course of conduct ever since, cooperating with the State of Illinois, by making repeated appropriations, the effect of which contemplated the continuance of this diversion of water by Illinois.

The Chief Justice: Although the consent had been refused, so far as the Executive was concerned?

Mr. Kirby: Yes, sir; but we had authority direct from Congress to make a diversion adequate to meet the needs of commerce, for the purposes of that canal.

When the act of 1899 was passed by Congress, may it please your Honors, Congress knew full well the full details of this project. They had before them the report of the Chief of Engineers showing exactly the quantity of water proposed to be diverted through this channel, 10,000 cubic feet of water per second. They knew the provisions of the Illinois act regulating the amount that Illinois was directing its subordinate to take out of Lake Michigan for the purposes of sanitation and navigation. And Congress has never acted since then to say that Illinois was prejudicing navigation—unless such action can be found in section 10 of this act.

Now, we think it important to keep in mind this distinction: That until Congress acted, Illinois had a right as a sovereign

to use those waters for sanitation; and all that it needed for sanitation, subject always to the superior power of Congress to interfere if it prejudiced the navigability.

In other words, while we are in a perfect position to say that the act of 1827 gave this consent of Congress, we are also in a position to say, under the doctrines of this Court in the concurrent jurisdiction class of cases, that, without the consent of Congress, or until Congress interfered to prevent, the State of Illinois, under its sovereign power could take as much water as it reasonably needed for such purposes as the State deems necessary. And the fact that these waters were partly within the borders of other States, and that to some extent this diversion might affect a foreign government, did not affect the right of the State—Congress' power being dormant—to deal with these waters as it pleased —subject always to the right of Congress to step in and say, "No."

The Chief Justice: You are now using extra time. You have consumed about thirty-seven minutes.

Mr. Kirby: My time was thirty minutes. I beg the Court's pardon.

The Chief Justice: Before you go, have you stated all of the legal propositions that you were reading?

Mr. Kirby: No, your Honor, I have not. But that is our misfortune.

Mr. Adcock: Go ahead and read them.

Mr. Justice Holmes: Will you tell me before you finish this: Is there somewhere in the briefs where those propositions are summed up that you can refer us to?

Mr. Kirby: I am afraid they are not summed up in this way in any of the briefs. It is a work that was done last night, for the purpose of condensing them.

The Chief Justice: Your associate says you can go ahead. Your side has the time.

Mr. Kirby: Thank your Honor. I will then read them without attempting to expound them.

Mr. Justice Holmes: I believe you had got through the fifth proposition.

Mr. Kirby: I think so, your Honor.

I am asked to say, in connection with what I have stated to the Court, that as late as 1904, after the act of 1899 had gone into effect, and after this present Sanitary and Ship Canal had been operating for four years, Congress, in one of the Rivers and Harbors Acts, granted consent to the State of Illinois to remove some of the obstructions in the Illinois River, the purpose of that grant being to stimulate and enlarge the flow of the Illinois River so as to exclude this diversion from Lake Michigan which was then being made.

And Mr. Adcock's brief in this case contains numerous instances in which Congress took action—not action indicating a hostile attitude towards the continuance of this diversion, but on the contrary, spending money and doing things which indicated a cooperative attitude by Congress with this continued diversion that Illinois was making, and with full knowledge on the part of Congress that Illinois was doing it for the purpose of sanitation, as well as for the purpose of navigation.

And now, I shall read the rest of the propositions:

"Proposition 5. Congress, by numerous acts providing for surveys and reports as to compensating works and means to offset for theoretical lowering of the level of the lake, has recognized the authority to divert; and if anything was to be done to offset for the effects upon navigation, Congress proposed to provide the works, instead of stopping the diversion.

If Congress had not recognized the authority and the right to diversion, it could easily, by special act, have stopped the diversion, instead of appropriating money to find means to make good what it was permitting us to continue to do.

Proposition 6: Congress has, in the improvements provided for in the Rivers and Harbors acts since appellant's channel has been opened, expressly taken care of any theoretical effect upon navigation.

The actual depths of harbors, are not less than the project depths fixed by Congress; so that actual navigability with respect to the harbors has not been prejudiced.

Proposition 7: The appellee must allege and prove substantial, unreasonable damage to navigation and to commerce. It has not sustained this proposition by proof, either with respect to the lakes, or with respect to the Chicago River.

Proposition 8: By virtue of the preceding acts of Congress, the Secretary of War, under section 10, had nothing to do with the quantity of diversion; and he so construed the situation in his original permit, and did not alter that position until 1913, after the district had made large expenditures carrying out the work contemplated by the original permit.

The jurisdiction of the Secretary was confined to issuing permits upon the recommendation of the Chief of Engineers, with reference to the manner of the construction of works in the Chicago River.

All the conditions of these permits have been complied with.

Either the Secretary of War has no jurisdiction over the quantity of the diversion, as we contend, or he has some jurisdiction. If he has jurisdiction, then in authorizing the construction of work at an expense of over $10,000,000, he exercised that authority and authorized the result of the work.

Proposition 9: The question before the Court is not whether there is a permit to flow 10,000 cubic seconds feet, but whether an existing work, through which flows that quantity, unreasonably interferes with the navigation of the river.

The proof is conclusive that there is no current in the Chicago River unreasonably obstructive to navigation; and as an instrumentality of commerce, it is one thousand fold superior to the river before appellant's expenditures began.

Proposition 10: For the sake of argument, forget all about permits and acts of Congress authorizing the diversion: The question, boiled down, is, Does the existing work protecting the health of Chicago substantially interfere with interstate commerce? If it does not, the works of Illinois being reasonable, any action on the part of the United States or even by Congress, destroying the same would be unreasonable.

Proposition 11: The equitable conscience of this Court cannot destroy $100,000,000 worth of property, and endanger the lives of 3,000,000 people, unless the law of the United States clearly and unmistakably so requires."

To which should be added that the act of 1910 did not intend to stop, regulate or interfere with diversions existing at that ime. It was prospective in its effect and intent, and not retrospective.

Mr. Adcock: You mean the act of 1899.

Mr. Kirby: I mean the act of 1899, under which the suits were brought.

The reference to the *Chicago Street Railway* case, Mr. Justice Holmes, is 201 U. S., 505, at 507.

Mr. Justice Sanford: I would like to ask you one question: In view of these arguments and propositions of law, would you allow that the suit could be maintained if the proofs showed that the diversion created a substantial impairment of commerce in the lakes?

Mr. Kirby: I would not, if a proper suit was brought for that purpose. But that is not this case.

Mr. Justice Sanford: Then you come back to the form of the suit?

Mr. Kirby: Yes, your Honor.

The Chief Justice: If you have not those points shown in your brief, you might make copies of those and hand them to the clerk.

Mr. Kirby: I thank your Honor.

Oral Argument of Hon. James M. Beck, Solicitor General of the United States, on behalf of the appellee, the United States of America.

The Chief Justice: Mr. Beck.

Mr. Beck: If the Court please: I have followed with great interest the first part of my learned brother Kirby's argument, and with great attention also; because in my judgment, its tendency is to sustain the contention of the Government, for the reason that it shows that, while the right of the Government to avail itself of an injunction to vindicate its paramount authority over the navigability of the Great Lakes is a justiciable question; yet the comparative benefits to the Mississippi Valley, or to the Great Lakes region, from the unlawful diversion of water from Lake Michigan is not a justiciable question, but is a political question, and that the forum to determine what shall be done, under a very trying situation, is for Congress and not for this Court.

For it is quite obvious, that this Court not only lacks the power, but lacks the means, to balance what have been called in the appellant's brief the equities of the case between Illinois and the Mississippi Valley and between the Great Lakes regions who, through their spokesmen, will shortly be heard.

Now, this case, notwithstanding a ponderous record and many briefs and the magnitude of the interests involved, seems to me a very simple one. It is like a watermelon, large in bulk but very slight in substance.

The contention upon which my friend based his last remark to the Court was that the form of this action was not to prevent an unlawful impairment of navigation of the Great Lakes, but simply to remove an obstruction in the matter of the Calumet River, and later, of the Chicago River. I shall presently show that that is a gross misconception of the language of the Government's bill.

Mr. Justice Sutherland: Mr. Solicitor General, before you get fairly under way, I would like to ask you this question: Does this narrative statement that has been furnished us by counsel on the other side from your point of view state the case correctly?

Mr. Beck: I think it is substantially correct. In our reply brief we have called attention to some inaccuracies; but we have no objection to the Court assuming its substantial accuracy, except where we have ventured to show that it was in error; and that has not occurred in many places. I have no doubt the narrative statement was prepared in good faith, and is a fair review of the 5,000 pages of testimony.

Now, before I come to the form of the action, I want to explain to the Court a little more in detail the history of these permits. I want to show, by chronological statement of the facts in the case, how far, as intimated by Mr. Kirby, the Government engineers and the officials in Washington have cooperated with the Sanitary District in changing the currents of two rivers and in diverting the waters of Lake Michigan to an amount which, if you estimated it, not in seconds, but in hours, staggers the imagination. I think that, if the Court will patiently follow me in this chronological statement of the official acts done between the United States and the Sanitary District, it will be in very little doubt, if any, with respect to the merits of the contention.

It begins before the Republic began, on July 13, 1787, when the Confederation passed the Northwest Ordinance, in which it was provided that:

> "The navigable waters leading into the Mississippi and the St. Lawrence, and the carrying places between the same, shall be common highways and forever free, as well to the inhabitants of this territory as to the citizens of the United States and those of any other States that may be admitted into the Confederacy, without any tax, impost or duty therefor."

When the Constitution took from the various States the power over interstate commerce, through conflicting regulations and imposed it in the Government they created, and when the first Congress of the United States came to meet, they reenacted this part of the Northwest Ordinance. So that, when the Territory of Illinois was constituted a State, it had, as this Court decided as recently as in the *Economy Light & Power Co. case,* reported in 256 U. S.—it decided that, while the Ordinance of 1787 making these Great Lakes and also the Mississippi River open highways for the benefit of the entire people of the United States—that while those provisions of the Ordinance did not act as limitations upon State authority, as contrasted with the powers which the Original Thirteen States had, yet, they did survive in full force as regulations of interstate commerce and as declarations of the National will with respect thereto.

Now, the next point to be remembered—and I shall refer to it hereafter; and I only refer to it now as indicating what should have been in the minds of the Sanitary District of Chicago when they embarked upon this hazardous experiment—is that, just a century ago, in this Court, in the case of *Gibbons* v. *Ogden,* the plenary power of the United States in respect to interstate commerce was vindicated; and thereafter it became perfectly clear, in a succession of decisions, that while, as to navigable rivers wholly within a State there were still reserved some rights with respect to local facilities and purely police regulations, whose validity would be assumed until Congress declared to the contrary, yet, with respect to interstate navigable rivers or highways, the State had no reserved power with respect to those, and that even if Congress had not acted with respect to interstate highways, yet its very silence and inaction was a declaration that those water highways should flow unvexed to the destination Nature had ordained for them.

Of course, the whole point in *Gibbons* v. *Ogden* was that, although the Hudson River was wholly within the State of New York, nevertheless it was not competent for the State of New York to determine the conditions of its navigability.

Now, that being so, we come to the point—and I shall dismiss it very briefly—we come to the two acts of Congress, of 1822 and 1827. Of the first it is unnecessary to say more than that, Congress having made a donation of land for the construction of a canal upon certain conditions, the conditions were never complied with and the canal was never built under that act.

When, however, Congress in 1827, acting upon a memorial of the people of Illinois, granted certain lands for the purpose of constructing a canal, the dimensions of the canal can be measured by the fact that the memorial which was addressed to Congress and upon which it acted contemplated an expense of $700,000. At all events, that canal is not this canal. And I venture to say that at the time that act was passed by Congress, Chicago was not even in existence, unless it was a trading post, with, possibly, a few houses; but at all events, as a municipality it was not in existence.

And I venture to say that no more untenable proposition has been advanced to this Court—and that is saying a great deal—than the suggestion that an act of Congress granting land in aid of the construction of a canal in 1827, for navigation purposes, before Chicago had any political existence—that that should be regarded, for all future time, as an authority to a city that thereafter came into existence to construct a canal the cost of which they say, with its attendant works, now amounts to $100,000,000—not for the purpose of navigation, but primarily as a common sewer. To say that the construction of a little canal nearly a century ago, for one purpose, is an implied authority for the construction of another canal for an entirely different purpose, is a proposi-

tion that I shall not take the time of the Court to further discuss.

In 1889, the State of Illinois embarked upon this hazardous, and as I fear it may prove, fateful experiment. They created, having had through various commissions examinations made into the subject of what should be done with the sewage of Chicago, which at that time was a city of about a million and a half people—they passed the act which created the Sanitary District, and which made it mandatory for all time for the Sanitary District to take from the waters of Lake Michigan an amount of water proportionate to each 100,000 people of that city. And that in face of the fact that, of course, Chicago was already growing by leaps and bounds.

Now, at that time, it is well to remember, three other great cities had, in the same decade, considered the same problem. London, which has twice the population of Chicago, and Berlin and Paris, which have approximately the same population as Chicago. And every one of them, without in any way diverting the waters of the waterways upon which those cities are located, found a way to dispose of sewage by eliminating the solids from the liquids, then treating the solids chemically, and in that way disposing of it in a way that still maintained the purity of the drinking water and at the same time the health of the people. And to this day the great city of London and the great cities of Paris and Berlin have solved this problem without any such unlawful appropriation of other people's waters as marked the action of the Sanitary District in this case.

However, there was this temptation to the State of Illinois to adopt the method that they were going to adopt, namely: That it was not only a great deal cheaper—because, as Secretary Stimson, I think it was, so well said when he came to dispose of the questions in one of the applications made to him, it was not merely a question of comparative methods of sanitation; it was a question of cost; and it was a great

deal more economical for Chicago to utilize the waters of Lake Michigan to flush a canal that was thenceforth, primarily, at least, a great sewer, than to dispose of its sewage in the approved, modern chemical methods such as were adopted by London, Paris and Berlin.

Moreover, Chicago determined to further reduce the expense of the improvement by constructing great hydroelectric works at Joliet, was it not?

Mr. Fleming: Lockport.

(Mr. Beck (Continuing): Great hydroelectric works at Lockport, to utilize the current thus created by the diversion of waters of Lake Michigan through the canal. And thereby it has maintained a very large electrical producing company, which has furnished the parks and the public buildings of Chicago with light, and has given a great advantage to Chicago by utilizing such power.

It is quite obvious that such power could never have been created had they not forced into this drainage canal this current of 10,000 cubic feet per second. Because, so far as the navigation is concerned, the reports of the engineers are that the diversion of 1,000 cubic feet per second is all that the canal needs for navigation; but that for the purpose of creating a current that would run three miles an hour, it was necessary to divert a much larger volume of water, and thereby create the hydroelectric works which would enable the cheap generation of electricity.

Thereupon the State by legislative act created, as I said, this Sanitary District of Chicago, which is the appellant in the case.

Now, before they had asked for a bid; before a spade had been driven into the ground; before there had been any expense incurred whatever by the City of Chicago, Congress, which up to that time had remained silent on the subject, passed a law which was a plain assumption of full authority

by Congress over the navigable waters and lakes of the country, and likewise included a specific prohibition of the very thing that the Sanitary District was planning. For under the act of September 19, 1890, passed shortly after the Illinois act which created the appellant, it was provided—

> "That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect to which the United States has jurisdiction, is hereby prohibited."

And it is further made unlawful for any one—listen to these words—

> "in any manner to alter or modify the course, location, condition or capacity of the channel of said navigable waters of the United States, unless approved and authorized by the Secretary of War."

Therefore, in 1890, before they had expended one penny upon this great improvement, they had fair notice that, if they thereby desired to impair or alter the course, location, condition or capacity of the channel of any navigable waters of the United States, they must first get the consent of the Secretary of War.

Now, let us see how they tried to get that consent, and what happened:

In 1892, the United States became aware of the fact that Chicago was planning a very extensive water scheme, which might threaten the navigability of the Lakes. A board of engineers was then appointed to consider and report upon "the probable effect of the operation of the Chicago Drainage Canal upon the lake and harbor levels and upon the navigation of the Great Lakes and their connecting waterways."

Now, please remember, therefore, that the War Department appointed a board of engineers before even the bids had been invited for the construction of any part of this work.

On March 22, 1895, the United States Engineer at Chicago wrote to the Sanitary District to ask for information to aid

the board of engineers, as to what conclusions the Sanitary District had arrived at as to the effect of its plans—I am now quoting—

> "upon the levels of the Great Lakes by the operation of your canal."

On August 16, 1895, the board of engineers reported—now listen to this:

> "The abstraction of 10,000 cubic feet of water per second from Lake Michigan will lower the levels of all the lakes of the system, except Lake Superior, and reduce the navigable capacities of all the harbors."

That would not seem to require any extensive engineering genius, to know that; because I would simply like to indicate to the Court what 10,000 cubic feet per second means in one single calendar day: It is 864 millions of cubic feet of water every day of the year that Chicago is now diverting, and has steadily diverted during the sixteen years that the United States, in its own courts, has sought by peaceful methods to stop it.

So I say that on August 16, 1895, the board of engineers of the War Department had already found the fact that the abstraction of 10,000 cubic feet of water per second would have that effect.

On June 16, 1896, the Sanitary District wrote to the Secretary of War, and after referring to the fact that the canal was under construction, asked his permission to proceed with the work upon the lines indicated, and so far as is consistent with propriety, the cooperation of the United States engineering department.

On July 3, 1896, the Secretary of War, having under consideration the question whether the abstraction of even 5,000 cubic feet of water per second would affect the navigability of the Chicago River and of the Great Lakes, permitted the change of the current of the Chicago River, with this proviso:

> "That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago

to introduce a current into Chicago River. This latter proposition must be hereafter submitted for consideration.

That it will not cover obstructions to navigation by reason of this work while in progress, or when completed."

So they had expressly said that, while the permit was given to extract 5,000 cubic feet per second from Lake Michigan, it was not to be interpreted as approval of the plans of the Sanitary District.

Now, on October 28, 1897, the Secretary of War, having under consideration an application of appellant to widen the Chicago River, gave the same authority, but with the same condition above quoted.

On November 30, 1898, the Secretary of War, having again under consideration an application—and when I say "an application," I mean always by the appellant—to build a coffer dam on the Chicago River, called the attention of the Sanitary District to the act of 1890—that is the act which I just read, which made it unlawful to alter in any way the channel of navigable waters.

On December 16, 1898, the Secretary of War, having under consideration appellant's application to remove certain bridges on the Chicago River, again granted leave; and again with a like recital of the paramount authority of the Federal Government.

On March 3, 1899, Congress strengthened the act of 1890.

And let me say how that came to be strengthened; because it has not yet been suggested to the Court: The act of 1890 made the creation of any obstruction not affirmatively authorized by law to the navigable capacity of any water in respect to which the United States had jurisdiction unlawful.

Now, this Court in the *Bellingham Bay Boom* case, held that the words "authorized by law" included the law of a State, as well as a law of Congress.

And thereupon, in 1899—and by that time the Sanitary District works were nearing completion but had not yet been completed—in 1899 Congress, presumably in view of the decision of this Court, that an obstruction might be authorized under a State law without offending the provision of that act, strengthened it in the following way; it provided:

> "That the creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of the waters of the United States is hereby prohibited."

And then it again added:

> "That it shall not be lawful in any manner to alter or modify the course, location, or condition or capacity of any port, canal, lake, or the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to the beginning of the same."

Now, on March 10, 1899, another permit was granted to erect another bridge over the Chicago River, with a like condition.

On April 22, 1899, appellant again applied for permission to open the channel constructed by it as soon as it was completed. That is interesting, as showing that when Congress strengthened the act of 1890 by the act of 1899, as a matter of fact their works were still under construction and had not been completed. The application recited the necessity under the act of 1890 of obtaining the authority of the War Department; that is, the appellant's own application recited the necessity of getting the consent.

Thereupon, it was referred by the War Department to the local engineer of the United States in Chicago. And I want to read a part of his report to his superior. He says:

> "It is a strange fact that this city has expended, or will expend, over $30,000,000 with the intention of diverting an apparently unlimited amount of water from the Great Lakes to the Mississippi drainage area for

sanitary purposes, without finding out whether such diversion would be allowed by the great interests of the United States and the Colonies of Great Britain along the chain of Great Lakes in the navigation of the rivers and harbors of the Great Lakes. Now they ask the authority of an executive officer of the United States to open a channel that will, to some unknown extent, lower the levels of all the Great Lakes below Lake Superior and of their outlets, introduce a current, also unknown, and not to be ascertained otherwise than by actual experiment, in Chicago River, the most important navigable river of its length on the glode, but which is already obstructed by bridges, masses of masonry and bends, and of difficult navigation at best."

On May 8, 1899, the Secretary of War authorized the opening of the channel upon the following conditions:

"The Secretary of War hereby gives permission to the said Sanitary District of Chicago to open the channel constructed and cause the water of Chicago River to flow into the same, subject to the following conditions:

"(1) That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"(2) That if at any time it becomes apparent that the current created by such drainage works to the South and main branches of the Chicago River be unreasonably obstructive to navigation"—

Note that:

"Be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close the discharge to said channel, or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South branch."

Then appears a third provision, that the Sanitary District must assume responsibility for all damage done to navigation by the change of the current of the river.

On July 11, 1900, the War Department, responsive again to applications of the Sanitary District, gave permission to make certain changes in the Chicago River, with the proviso that they were to be subject to the conditions that I have already read.

On April 9, 1901, the Secretary of War restricted the flow of the Chicago River to 200,000 cubic feet per minute.

On July 23, 1901, the Secretary of War again, on application of the appellant, modified the order, so as to permit 300,000 cubic feet per minute between certain hours.

Mr. Justice Holmes: What date was that?

Mr. Beck: July 23, 1901.

On December 5, 1901, upon a further application of appellant, a permit was granted it to divert 4,167 cubic feet of water per second, upon the following conditions—

Now, while our case does not rest upon this permit, yet it is well to remind the Court that the question before the Court is, not whether Chicago Sanitary District was planning these vast works; it is not whether the Sanitary District shall stop the appropriation of the waters of Lake Michigan. It is purely a question whether the Sanitary District shall be entitled to take more than 4,167 cubic feet per second from Lake Michigan, for its municipal purposes. And again, translating that into a day, it means, each day, 432 million cubic feet.

Now, in 1901, the Secretary of War granted permission to take 4,167 cubic feet of water per second; and these were the conditions upon which he gave the permit:

> "That this permission shall be in lieu of the present authorized rates of flow as stated above."

That referred to the 300,000 cubic feet per minute between certain hours of the day, for a certain time.

> "(2) That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require."

So it was not merely a question of the navigability of the Chicago River, as to which there was a contention that this vast forced current was affecting its navigability. The Secretary of War said that, whatever the public interests might hereafter require, the permission must be regarded as subject to that.

Then follows the third provision, as to the responsibility of appellant for damages to navigation.

On December 29, 1902, the Secretary of War issued a permit authorizing the Sanitary District to divert for a certain 350,000 cubic feet per minute. That is, of course, a great deal more in a day; and in issuing the permit it was stated:

> "We recognize your responsibility as guardian of the interests of navigation."

On January 17, 1903, a permit was granted of the additional flow of 350,000 cubic feet per minute until March 31, 1903, when it expired.

On March 14, 1903, the Illinois Legislature increased the corporate limits of the City of Chicago, which, of course, very much changed the nature of the problem; and although it is not necessary for my case to say that what was done when Chicago was a small city is not necessarily binding upon the Government in reference to the larger city, yet it is well to remember, when you consider the acts of the Washington Government in this matter, that the situation was changed with the growth of Chicago, and with this special act, which very much increased it.

On March 14, 1907, the Secretary again having under consideration an application to reverse the flow of the Calumet River—and now we come to where the fight begins. They thereupon, having obtained the permission of the Secretary of War to change the current of the Chicago River so that, instead of flowing into Lake Michigan, it would thence flow through various rivers into the Mississippi, and thence to the Gulf—

Mr. Justice Holmes: (Interposing) Was that in 1907, did you say?

Mr. Beck: 1907, yes, this last date; March 14, 1907. They thereupon asked for a like provision to reverse the flow of the Calumet River, so that it would flow southward, instead of eastward.

Mr. Justice Sutherland: That is further north, is it?

Mr. Beck: It is further south.

Mr. Justice Sutherland: Yes, I see—it is southwest.

Mr. Beck: The Secretary of War, after reciting the report made by the Chief of Engineers on this application, which stated that:

> "In my opinion, this abstraction will undoubtedly lower the levels of all the waters of the Great Lakes, except those of Lake Superior, and thus diminish the nagivable capacity and depth of the various channels and harbors which have been deepened and improved under authority of Congress."

After reciting that, the Secretary of War declined the permit, stating that it was one that required submission of this great question of capital and National importance to the Congress of the United States.

On September 11, 1907, the Secretary of War again, upon an application to connect Lake Michigan with the North

Branch of the Chicago River, gave the permission, with the express proviso:

> "That the total diversion of water from Lake Michigan through the Chicago River into the Illinois River shall be no greater than already authorized by past War Department permits."

Now comes the act as to which Mr. Adcock was prudently very silent.

Up to that time the Sanitary District had recognized the paramount authority of the Federal Government over these extra territorial waters—I mean Lake Michigan. It had at all times recognized that all it could obtain of waters that were beyond its territorial boundaries was that which the Federal Government would permit. It also recognized that it could not reverse the course of two rivers that, for centuries had flowed into Lake Michigan, without the consent of the Federal Government.

But the moment that the Secretary of War declined to reverse the course of the Calumet River, as he had authorized the reversal of the course of the Chicago River, the Sanitary District thereupon passed this resolution:

> "Whereas, This board is advised that it has the right and that it is its duty under the laws of the State of Illinois to construct its said channel and reverse the flow of said Calumet River, notwithstanding the refusal of the Secretary of War to issue a permit authorizing the same, for the purpose of furnishing the proper sanitary methods of disposing of the sewage of the territory and inhabitants contiguous to the said proposed channel and within the corporate limits of the Sanitary District of Chicago, and unless restrained by a court having jurisdiction of the subject matter at the instance of the United States Government."

In other words, it simply flouted the Federal authority over the question and insisted that it was going to take what Chicago needed for its sanitary purposes, the War

Department to the contrary notwithsanding, unless a court should declare otherwise.

Mr. Justice Butler. What was the date of the resolution?

Mr. Beck: The resolution, sir, is September 18, 1907.

On March 23, 1908, on what was an implied invitation to us to begin an action if we wanted to vindicate Federal authority, we brought this action.

It has been intimated to this Court—or, at least, perhaps I misunderstood my learned brother—that all that this action contemplated was an action to restrain obstructions in the Calumet River. Now, let me read, so that you may know the nature of this suit that we brought after the challenge to our authority.

Without taking too much time to read it, the third and fourth paragraphs at great length—I am reading from volume 8 of the transcript of record—paragraphs three and four at great length describe the impairment to the levels of the Great Lakes by the proposed construction; and then coming down to the final averments of the bill, which will show its true nature, it says:

> "*Eleventh.* Your orator further represents, upon information and belief, that the defendant desires, proposes and intends to divert the waters of Lake Michigan as aforesaid, through the said Calumet rivers and the Calumet-Sag Channel as aforesaid, for sanitary purposes and for the development of valuable water power which it proposes to sell; that the Congress of the United States has not fixed any amount of such waters for such proposed diversion, and has not provided for the diversion of any of such waters through the said Calumet rivers and the said Calumet-Sag Channel, and that the Secretary of War of the United States, under the direction of Congress, or in any other way, has not fixed any amount of such waters for such proposed diversion, but, on the contrary, has refused so to do, and has refused to authorize the diversion of any of such waters through said rivers and said channel.

"*Twelfth.* Your orator further represents that the defendant cannot lawfully construct or maintain the said proposed Calumet-Sag Channel as above described, cannot lawfully reverse the flow of the said Calumet rivers as it plans and proposes to do as aforesaid, and cannot lawfully divert and abstract the waters of Lake Michigan as it plans and proposes to do as aforesaid.

"*Thirteenth.* That the defendant on the sixteenth day of October, 1907, actually began the excavation of the said proposed Calumet-Sag Channel, at the westerly end of the same, with a force of men under the supervision of one William M. McCartney, its assistant engineer, and your orator is informed and believes, and so charges the facts to be, that the defendant intends to, and will, continue and complete the construction of said channel," etc.

Well, perhaps I ought to read it:

"And will, continue and complete the construction of said channel, reverse the flow of the said Little Calumet and the said Calumet rivers as aforesaid, and divert and abstract the waters of Lake Michigan as aforesaid, and maintain said channel as aforesaid, to the manifest and irreparable injury of your orator and its interstate navigation and commerce, unless restrained by the injunction of this honorable court."

It is an amazing fact that we are now in the concluding chapter of that litigation, that has been pending for 16 years. And if this Court will read the bill and answer, you will see that, notwithstanding a great deal of disingenous pleading—I mean averments in the answer—there was no reason whatever why the case should not have been disposed of upon bill and answer. And yet 5,000 pages of testimony were taken upon issues that, while appropriate before a committee of Congress, were wholly inappropriate in a judicial proceeding. And six years were consumed in that way.

On June 27, 1910, notwithstanding the pendency of this suit, they again applied to the Government for permission to open this channel, with the understanding, as they con-

cede, that the total quantity of water to be withdrawn from Lake Michigan was not to exceed that already authorized by the Secretary of War.

The Secretary, on June 30, 1910, granted the permit, upon the following conditions, among others:

> "(*a*) That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.
>
> "(*d*) That the amount of water withdrawn from Lake Michigan, through the Chicago and Calumet rivers together, shall not exceed the total amount of 250,000 cubic feet per minute (4,167 cubic feet per second) already authorized to be withdrawn through the Chicago River alone."

And, therefore, our Government, acting with the very greatest consideration for the interests of the City of Chicago, having first refused permission to reverse the flow of the Calumet River, now granted it; and it was accepted, and the current was reversed by the Sanitary District of Chicago, upon the faith of what the Secretary of War had provided, that it would not take from the waters of Lake Michigan more than 4,167 feet.

February 5, 1912, appellant asked the Secretary of War for permission to withdraw from Lake Michigan not to exceed 10,000 cubic feet per second, such permission to be revocable. By this time it was quite clear that it was not merely a national question; it was international. The British Empire had intervened and protested against what, to them was a great wrong. The Dominion of Canada had its representatives make representation that they were being affected, as far as the St. Lawrence River, by this diversion, because at that time they were using far in excess of the amount that they were permitted to take—on this diversion of 864 million cubic feet of water per day.

On January 8, 1913, the Secretary of War rendered his opinion. Now, I will not take time to read that, although it would be the most effective thing I could do in argument. But that was by Mr. Stimson, as Secretary of War. On this application of theirs to divert 10,000 cubic feet of water per second, the Secretary held it under consideration for 11 months; and in those 11 months the most patient and exhaustive hearings were held. At those hearings were not only all the great interests involved in this controversy represented by counsel, but the Dominion of Canada likewise.

In those hearings, it was shown that the levels of the Great Lakes had been reduced, anywhere from four to six inches; and that it had an effect upon navigation which, in its most moderate estimate, was not less than $1,000,000 per year to private owners; that its effect was felt as far as Niagara Falls, and as far as the water power projects on the St. Lawrence River.

And let me add that the chief engineer for the Sanitary District disclaimed any intention to question the calculations of the engineers. There were various boards of engineers who, upon a patient and exhaustive examination, had found that the Great Lakes were slowly falling and that, in many of the important harbors, there were already very practical and serious consequences due to the act of the City of Chicago.

Secretary Stimson thereupon refused to grant the permission. He rendered an opinion, which the Court will find in the record, and he made certain findings of fact. And the ultimate findings are these:

> "*First.* That the diversion of 10,000 cubic feet per second from Lake Michigan, as applied for in this petition, would substantially interefere with the navigable capacity of the navigable waters in the Great Lakes and their connecting rivers.
>
> "*Second.* That that being so, it would not be appropriate for me, without express congressional sanction, to permit such a diversion however clearly demanded by the local interests of the sanitation of Chicago.

"*Third.* That on the facts here presented no such case of local permanent necessity is made evident.

"*Fourth.* That the provisions of the Canadian treaty for settlement by joint commission of 'questions or matters of difference' between the United States and Canada offer a further reason why no administrative officer should authorize a further diversion of water manifestly so injurious to Canada against Canadian protest."

And thereupon he declined to grant the petition.

On February 24, 1913, following that, the United States Engineer at Chicago, becoming aware that Chicago was using a great deal more water than the permit had given authority to use, wrote to the appellant and asked what it intended to do to keep future operations within the limits of existing War Department permits.

To that letter there never was a reply.

On March 15, 1913, the United States Engineer at Chicago again wrote to the Sanitary District of Chicago, for a reply.

On March 22, 1913, the attorney for the Sanitary District wrote a letter to the engineer, in which he suggested that it would be well for the Government to bring another suit, in which he said that if we brought another suit that would cover all phases of the litigation, that he would speedily—I quote his words:

> "The Sanitary District will cooperate to speedily make up and try the issues"

of the case.

Now, there never was a disputable issue of fact that a court could consider, and very few disputable questions of law that need any real discussion; because all pertinent questions of law were decided by this Court just a century ago in *Gibbons* v. *Ogden*.

And yet this cooperation that is "to speedily make up an issue" and get a decision upon the merits of the second suit

(which we thereupon brought) has been so manifest that today, eleven years later, we find ourselves in the Supreme Court, still vainly asking for an injunction that we had asked sixteen years ago to prevent this impairment.

On October 6, 1913, the Government commenced its second suit.

And again I say to the Court, before you read any of the testimony in this case, only read the pleadings. They are voluminous; they are prolix; they contain a great deal of irrelevant matter; but if you read the pleadings, you will marvel that the case was not passed upon by the court on bill and answer.

Now, we come to what happened to the legal proceedings. And here is a chapter that it is difficult to dwell upon with self-restraint:

For six long years the Government of the United States was held back by testimony, nearly all of which had no legal relevancy whatever. It was on the ground of Chicago's sanitation needs; and whether we had acquiesced by estoppel, and various other issues that you will see in the record; but none of them of sufficient merit to have had any serious discussion by opposing counsel.

At the end of six years, it was at length submitted to Judge Landis. Judge Landis held the case for six years more; and at the end of six years, the Government protesting against the delay, he sent for counsel and thereupon told them that he had found the facts in favor of the Government; that he had reached the conclusion upon the testimony that the navigability of the Great Lakes was affected. He sustained the legal contentions of the Government. He sustained our contention, made from the beginning, that these affirmative defenses which had taken all this time were irrelevant in law. We had filed exceptions from the beginning, protesting against the prolongation of legal proceedings, by all manner

of irrelevant defenses; and our exceptions had been overruled. And now, at length, after the horse was stolen, the barn door was closed, by saying that we were entirely right, that these affirmative defenses were valueless.

Mr. Justice Brandeis: What was the date of that?

Mr. Beck: The decisions of Judge Landis?

Mr. Justice Brandeis: Yes.

Mr. Beck: It was on June 19, 1920. Now, Judge Landis felt that he owed some explanation to the Government of which he was an administrator of justice, and to the parties; and he said that his delay was in part due to the fact that the Great War was in progress—although it would occur to some of us that the very existence of the Great War made the navigability of the Great Lakes of even greater concern.

Secondly, he said that he had the understanding that there was a possibility of a composition of differences here, that would enable the questions to be permanently adjusted; and then at the end of his oral opinion, which directed a decree in favor of the Government, he gave what was evidently, and what he himself says was, his real reason: He said that he did not want the injunction that he directed to issue to us for 30 days; and he added:

> "Make that 60 days, and you may put in it, if it does not destroy the appealability of the order, you may put in a provision retaining me in control. The thing that the Government wants, at least the court wants, being a citizen of Chicago, the thing I want is water without microbes. That is why I have held your lawsuit."

Thereupon the counsel, still "speedily cooperating" with us for a speedy decision of the case, sought leave to open the case *de novo*, in order that the decree could be modified —with this extraordinary suggestion: That if we, having for six years litigated this question, and having now established that we were entitled to the injunction to restrain them from using more than 4,167 cubic feet of water per second—

they now came in and said, "If you will allow us to take 10,000 cubic feet a second, and will give us 25 years, at the end of 25 years we hope to take care of the sewage of Chicago in excess of that, for which the 10,000 cubic feet is now adequate."

In other words, they wanted us, at the end of the litigation, to surrender every contention we had made, accept their diversion of 10,000 cubic feet a second, and trust to them that, as Chicago went forth with the stride of a giant, at the end of 25 years they might do something to stop the further diversion of water from Lake Michigan.

Now, Judge Landis having given this oral opinion and directed the decree, thereupon, for two years more, he refused to enter that decree. The Government protested; it protested again and again. Judge Landis would not enter the decree. They could not appeal.

I became Solicitor General. The archives of our Department were full of letters from the Secretary of War asking whether something could not be done. He, in turn, was subjected to pressure from the great States that were being seriously affected. And finally I determined—and I say it without hesitation—to address a communication to the Judiciary Committee of the House of Representatives calling attention to the fact that, although we had obtained a recognition of our rights to an injunction, the formal order and decree we could not get the court to enter.

Mr. Justice McReynolds: Mr. Beck, is there anything to hinder the United States from asking for a mandamus to overcome a situation like that?

Mr. Beck: I think there is no reason—

Mr. Justice McReynolds (Interposing): I have considered it myself in the past; and I wish you would try it the next time this thing happens.

Mr. Beck: I am greatly obliged for your Honor's suggestion; and I certainly will take the liberty of submitting it to the Attorney General.

But if every city in this country were to adopt what I say, with reluctance, was the selfish policy of the Sanitary District of Chicago, the only way that the Federal Government could vindicate its authority would be, not to go into its courts at all, but to do exactly what was done at the time of the Pullman strike—to stop by force such forcible appropriation of something that does not belong to the City of Chicago.

Well, Judge Landis, I say, for two long years refused to enter that order; and just as I was about to make it the subject of a communication to the Judiciary Committee of the House of Representatives, he was translated into the higher realms of baseball jurisprudence; and thenceforth the Government started with a new deal.

Nevertheless, it was another year before we finally got the decree—I do not say this with respect to Judge Carpenter as being any criticism of him; because when the case was finally assigned to him, after Judge Landis had resigned, Judge Carpenter was ill for a time; and it took time to do it; and there is not the slightest imputation on my part of any delay on the part of Judge Carpenter.

But at all events, it was June 18, 1923, before we finally got a decree, in a case that we had instituted fifteen long years before in the courts of this country, to vindicate the authority of the United States.

Now, those are the skeleton bones of this controversy.

Can this Court recall, in all the litigation of this character, anything comparable to this? There have been many controversies before this Court between the United States and either private interests or public interests, with respect to obstructions wholly within a State, and concerning nav-

igable waters that were wholly within a State. But can this Court recall a single instance where, in the case of a great interstate water highway connecting the heart of the continent with the Atlantic ocean, dedicated by the Ordinance of 1787 forever as a public highway; authority over which, plenary in character, was assumed by the Constitution of the United States—where a suit having been brought under that Constitution, namely, to stop just such unlawful and conflicting action of the States with respect to interstate commerce, there has been anything comparable to this. Can you imagine a waterway so vast in extent and so purely national and international in character that could be impaired and the interests of every one having rights upon that great highway be sacrificed for sixteen years by a city, however great? And no one admires the greatness of Chicago more that I do. As the Chief Justice said yesterday to the learned counsel for the Sanitary District—he said: "Well, you needed the water; is that not the fact, that you needed the water?" And he assented. The only defense that can be suggested is that they needed it, and they took it. And they are taking it to this day; and they are going to take it just as long as the strong arm of the Government fails to stop them.

And the great problem that is going to confront this Court, I venture to say, is not going to be so much the problem of the legal merits of the case, but what to do with the conditon which has been created by the unwillingness of the Sanitary District of Chicago to respect Federal authority, and which, unfortunately, may affect millions of men and women.

Of course, it will be understood that the Government does not concede for one moment that the utilization of 4,167 cubic feet per second will not answer the sanitary needs of Chicago. It may not answer the hydroelectric needs at the works at Lockport. That is a different proposition. But if it had ever been necessary for the Government to take up the question as to how far the health of Chicago could be preserved

by the utilization of this vast quantity of water which we permit, why we would have had some testimony to offer on that subject.

The attitude of the Sanitary District of Chicago in this matter recalls to my mind language used by this Court in a case which, if any other opinion than that of *Gibbons* v. *Ogden* was necessary, would be very pertinent authority. I mean the *Wheeling Bridge* case. In the *Wheeling Bridge* case, the State of Virgina authorized, as the Court will remember, a bridge across the Ohio River. The bridge was wholly within the State of Virginia. Pennsylvania brought a bill to restrain the maintenance of that bridge.

Now, let us see what this Court said with respect to what was fairly due to a court of equity—and if that is due to a court of equity in litigation between one State and another, how much more is it due to a court of equity where the United States in its soverign capacity is the litigant? This Court said in the *Wheeling Bridge* case:

> "The Bridge Company had legal notice of the institution of the suit, and of the application for an injunction to stay their proceedings, before their cables were thrown across the river. This should have induced them to suspend, for a time, their great work, alike creditable to the enterprise of their citizens, and the genius and science of the engineer who planned the bridge and superintended its construction. It is a matter of regret that, by the prosecution and completion of the bridge, they have incurred a high responsibility.
>
> For the reasons and facts stated, we think that the bridge obstructs the navigation of the Ohio, and that the State of Pennsylvania has been, and will be, injured in her public works in such manner as not only to authorize the bringing of this suit but to entitle her to the relief prayed."

Now, if only the administration of the Sanitary District had read those words in 1890, before they had ever incurred so much as a dollar of expense; before the work of construc-

tion had begun; if they had then said, "In view of the position of the United States Government and this act of Congress which forbids us to in any way alter, modify or affect the navigable capacity of any river or lake"—if they had said, "We will not proceed in the thing until we first see whether we can get the approval of Congress", the very serious and difficult situation that confronts this Court—and that will confront, I venture to predict, the Congress—would all have been spared.

Because at that time it might well have been that Congress would have said to the State of Illinois, "If you can purify your sewage by the methods adopted by London, Berlin and Paris, and without impairment of the waters of Lake Michigan, we cannot give you the consent and you must use other methods known to science"; or the Government might have said, "We will cooperate with you to the extent of allowing a certain amount of water—always provided that the amount of water that you divert does not substantially affect the navigation of the Lakes.

And they might then, long since, instead of now; instead of now, at this late day asking for 25 years in which to prepare to respect the rights of others—they might well have said, "Give us the 4,167 cubic feet per second and we will start now, in 1900, the construction of a sewage disposal plant according to enlightened and scientific methods. We have no desire to injure other interests on the Great Lakes; the Great Lakes are the pride of Chicago, as well as of Duluth, Cleveland or any other city they are on. It is our highway as well as theirs; and therefore we will not in any way impair the navigable capacity."

But instead of doing that, with the full knowledge of the position of the Federal Government, they proceeded to spend hundreds of millions of dollars, upon a plan that is destructive of all—I will not say "comity", because it is not a question of comity; it is a question of power. It is violative of

the power of the Federal Government as the great trustee of the interstate navigable waters, and is certainly destructive of the great interests of millions and millions of other people who live along the Great Lakes.

And if it were permitted, of course it would simply mean that, if Chicago could utilize at pleasure the waters of Lake Michigan, Cleveland can do it; Duluth can do it; Buffalo can do it; and we would be back exactly where we were before the Constitution of the United States was adopted, namely, a mass of conflicting regulations of commerce, with States and Cities grabbing everything in sight, without reference to the common weal; and with a state of affairs which, had the Constitution of the United States not been adopted, might conceivably have ended in war.

Because, as a matter of fact, nothing is more significant in the proceedings of the Constitutional Convention, than the very grave apprehension that Washington felt, and Franklin felt and others felt, that if that convention failed method of adjustment between the constituent States would be one of the sword and the gun, and not the peaceful methods of the political charter.

Now, I think I can complete before the Court takes a recess all that I care to say. I had intended—but it seems so useless—to make an argument upon the legal propositions; I cannot think that they can be in any doubt.

The Chief Justice: Mr. Beck, there was an issue made as to the proof, or the weight of the proof—as to whether this diversion reduced in any way substantially the depth of water in the ports and the harbors along the Great Lakes?

Mr. Beck: Well, yes; but our answer to that would be that the finding of the Secretary of War at the time that first suit was started was conclusive of the question as to the effect; and that therefore it was not any longer open to judicial controversy.

But if you eliminate the effect to be given to his findings—and he was the person to whom Congress had delegated the authority; because he was not speaking as Secretary of War; he was speaking as the authorized arbiter of Congress; and when Congress said, "If the Secretary of War finds that an obstruction exists," I take it that that, as any political act of Congress, would be binding upon the judiciary, unless there was, of course, a gross abuse of discretion in the matter.

Well, I was about to say that I will not pretend to discuss the authorities; because our friends attempted two gigantic tasks: The first task was the phenomenal one of diverting some of the waters of the Great Lakes from their natural destination in the Atlantic Ocean to the Gulf of Mexico—and that was an undertaking grandiose enough to be worthy of Chicago.

The second was equally remarkable—to divert the decisions of this Court for a hundred years, from their course and where their destination now is—and from their immediate origin a century ago, when Mr. Webster in the case of *Gibbons* v. *Ogden*, established the exclusive power of Congress with respect to the interstate waterways of the country. And I think that, as the engineers found in difficult to reverse the current of the rivers and of the lakes, their very great legal talent will find it very difficult—in fact, if we may judge by my friend Mr. Adcock's opening remarks he has found it very difficult—to change the current that has flowed for 100 years of legal authority.

If more than the case of *Gibbons* v. *Ogden*, were needed, I need only remind the Court of the year 1851, when three cases were decided that were conclusive. One case was the *Wheeling Bridge* case, to which I have already referred, in which it was held that, although a bridge was wholly within a State and authorized by that State, yet if it were over a navigable river of an interstate character, the State was without any authority to grant the permission.

The second, of course, was the case of *Cooley* v. *Board of Wardens,* where, although the particular local regulation was recognized, yet it was expressly on the ground that, while, with respect to waters wholly within a State and regulations of a purely local character, they would be recognized in the absence of Congressional action, yet, where it was not of that nature, and where the effect was to regulate or obstruct interstate commerce with respect to matters as to which a uniform rule was required, there the power of the Federal Government was exclusive, without regard to Congressional action.

The third case was that of the *Genesse Chief,* decided in that great term of the Court, where this Court held that the Federal Government had an admiralty jurisdiction over these Great Lakes, which it denominated as "great inland seas."

Now, the law as thus defined at that time has never been expressly questioned. And it, possibly, has had a very recent and a very careful defintion in the *Minnesota Rate* case, where Mr. Justice Hughes, in speaking for this Court, said:

> "The grant in the Constitution of its own force, that is, without action by Congress established the essential immunity of interstate commercial intercourse from the direct control of the states with respect to those subjects embraced within the grant which are of such a nature as to demand that, if regulated at all, their regulation should be prescribed by a single authority. It has repeatedly been declared by this Court that as to those subjects which require a general system or uniformity of regulation, the power of Congress is exclusive. In other matters, admitting of diversity of treatment according to the special requirements of local conditions, the states may act within their respective jurisdictions, until Congress sees fit to act; and, when Congress does act, the exercise of its authority overrides all conflicting state legislation."

This Court will remember that in the *Newport and Cincinnati Bridge Co.* case, decided some years after the *Wheel-*

ing Bridge case, not only Kentucky and Ohio had legalized the bridge, but the United States legalized it, and thereafter it became apparent that the obstruction, either by the growth of population or the changes in commerce, or otherwise, while originally not a nuisance, had become a nuisance. And Congress withdrew its consent. Thereupon it was said—and it is so apt to the argument which has been made here today, that Congress, by some species of estoppel, or acquiescence, or waiver, has permitted Chicago to construct this great canal and is therefore estopped from any action with respect to it.

It is fair to remember that, in the *Covington Bridge* case, Congress having withdrawn its assent, this Court said that Congress had full power to withdraw what it had once given; for the very reason that, of course, as the trustee of interstate commerce, it cannot bargain away its mighty trust; it cannot sell or barter away forever its police power. It certainly has the right at any time when, in the changing conditions of commerce it becomes necessary for a new rule or regulation with respect to that commerce to be adopted, to prescribe a new plan, even though it conflicts with some regulation that it has previously made.

(Thereupon, at 2:00 o'clock p. m., the Court took a recess until 2:30 o'clock p. m.).

AFTER RECESS.

Oral Argument of Hon. James M. Beck, Solicitor General of the United States—Resumed.

The Chief Justice: You may proceed, Mr. Beck.

Mr. Beck: If the Court please: I had almost completed my argument at the time the Court adjourned.

But there is one practical consideration that I want to bring to the attention of the Court before I conclude:

Throughout this litigation—and I think the Court will agree with this when it comes to examine the matter—the Government has not been unmindful of the welfare of the people of Chicago. Now, the United States represents, in all matters within its reserved powers, the people of the City of Chicago, not the Sanitary District. And the Government is still very mindful of the welfare of the people of Chicago. It would not have allowed this litigation to drift for sixteen years, if it had not been sensible to what is a hard situation, due to the fact that Chicago is committed to an experiment from which it cannot in a day extract itself.

And therefore, at the end of my brief—somewhat over italicized—I venture to make a suggestion to the Court, if it should reach the conclusion that the Government's contention is right. I will briefly read the substantial part of it; and with that I will close my argument:

> "It is a condition and not a legal theory that confronts the Government. The question is not judicial, and this Court will presume that the Legislative and Executive branches of the Government will not be unmindful of all the equities of the situation.
>
> "As this serious problem will require time for its careful consideration, the Government cannot object, if the Secretary of War, acting on the recommendation of the Chief of Engineers, sees fit, pending the action of Con-

gress, and as a *modus vivendi* to modify the existing permit and temporarily permit a greater diversion of waters."—If he sees fit.

"If there be any doubt as to his power under the authority already delegated to him, the Government has no objection to a proviso in any decree that this Court may enter which will provide that the decree and the injunction, while immediately effective, shall be without prejudice to any temporary permit that the Secretary of War, acting upon the recommendation of the Chief of Engineers, may see fit to grant in the nature of a *modus vivendi*, pending the action of Congress in the premises.

"This would set at rest the authority to make some temporary arrangement in the event the present Congress could not dispose of the question before it adjourns *sine die* on March 4, and especially in the event that Congress might not be again in session until the first Monday of December next.

"It should, however, be made clear that the recognition and enforcement of the just rights of the United States Government are not to depend on or to await the conclusion of any argument between the Sanitary District and the Government. It should not be a question of what the Sanitary District should now concede, but what the Government of the United States should now allow.

"If Congress, (or the Executive, to the extent of its delegated power), voluntarily and in consideration of the inherent difficulty of the situation and the welfare of the people of Chicago gives some temporary permit until the whole problem can be finally solved by Congress, there should be no further opportunity for the Sanitary District to begin the litigation afresh and prolong it for another sixteen years under the plea that the decree of this Court was entered upon the faith that the Sanitary District and the United States Government should make some contract in the matter.

"The question is not one of contract, but of governmental power. The United States has the right to stop the unlawful diversion of the Sanitary District of the waters of Lake Michigan for the uses of the City of Chicago.

"In exercising this power, it need not bargain or contract with the Sanitary District.

"Its power is not that of a coequal, as the learned counsel for the Sanitary District seem to intimate, but the power of a sovereign."

Mr. Justice McReynolds: What relief have the United States asked in this matter?

Mr. Beck: We have asked that they be enjoined from diverting any waters of Lake Michigan in excess of 4,167 cubic feet per second.

Mr. Justice McReynolds: Well, what authority have we to go into that?

Mr. Beck: What authority? I do not think this Court has any authority to go into that. But I think this Court, in entering a decree, could eliminate any doubt on the subject, by making it clear that the Secretary of War, acting on the recommendation of the Chief of Engineers, that being the authority to which the Congress has delegated it, can, if he sees fit, grant a temporary permit, in the nature of a *modus vivendi*, for the excess—

Mr. Justice McKenna (Interposing): And go over this whole investigation again? Do you mean to go over the whole investigation again?

Mr. Beck: No, sir. That is why I was so insistent that, if this Court should follow that suggestion, it be made perfectly clear that it is not a question of any negotiations or contracts with the Sanitary District; but it is wholly a question of what the Government now, proceeding in its own way, will allow, if anything, beyond what it has already granted.

Mr. Justice Holmes. You mean merely to make it plain that the injunction will not prohibit allowing the use of the water to such extent as the Secretary of War for the time being, working under the act of Congress, may permit?

Mr. Beck: Yes, sir, that is the thought of the Government.

Argument of Hon. Andrew B. Dougherty, Attorney General of Michigan, amicus curiae, in favor of appellee.

Mr. Dougherty: May it please the Court: I am here as the representative of the Attorneys General of seven great States bordering on the Lakes—all of those States except the State of Illinois.

We have a vital interest in this suit. We all believe that we have property rights in the waters of the Great Lakes. We have on those lakes and connecting rivers 2,900 and some-odd miles of coast line. The State of Michigan, where I live, has 1,624 miles of coast line. All of it, except that part bordering on Lake Superior, is affected disastrously by any diversion of water. Lake Superior, being above the falls of the St. Mary's River, of course, is not affected. But every drop of water taken by the State of Illinois, or its agents, must necessarily substract a drop from the waters of Lake Michigan, from the waters of Lake Ontario, from the waters of Lake Huron, and a smaller proportion from the waters of Lake Erie.

Mr. Justice McReynolds: Are you asserting any right of your own here under this bill?

Mr. Dougherty. I am not a party to the bill.

Mr. Justice McReynolds. I am trying to see what your claim is: Are you representing the Government, or what?

Mr. Dougherty: I am with the Government.

The Chief Justice: He is the Attorney General of Michigan.

Mr. Dougherty: I am the Attorney General of Michigan.

Mr. Justice McReynolds: Well, do you stand on the rights of the United States, or on your own, or what?

Mr. Dougherty: We stand on the rights of the United States.

Mr. Justice Holmes. While asserting that, I presume your position is that, if you see fit to bring a bill, you would have a *locus standi* to bring suit?

Mr. Dougherty: Yes, we would have. Wisconsin brought an original bill in 1922. That bill has been answered, and the case is now in abeyance and will be brought to trial and orders for proofs taken, I presume.

The Chief Justice: And we permitted you to argue here because you were directly interested in the question whether the United States had power to bring this bill and enforce it?

Mr. Dougherty: Yes, your Honor. We are interested, in Michigan, Wisconsin and Minnestota, and in other States in a lesser degree, in these lakes, because they are the great natural highway of the interior of the country.

We produce in those three States a large proportion of the iron ores. They must all go to market. They have to go to market in the East. They have to go over the Lake course—at a cost of one-tenth of the railroad freight. Those things have to be brought down from day to day and from year to year, to keep pace with the economic advance.

Now, Mr. Goulder will follow me for a few minutes; and I have but a few minutes to speak. But let me say that the commerce of the Great Lakes has increased some 4,000 times since the St. Mary's canal was built. All the ores goes through that way, except a few that go out of Escanaba and go to Chicago.

And the gentlemen said that it was only the large interests that were complaining. If your Honors please, every man who owns a fishing boat and keeps it in the mouth of a creek or cove; every man who owns a pleasure boat, has suffered from this.

Now, I am not going to take any time to go into the argument of whether these lakes have been lowered or not; but I want to state one fact:

The three largest tributaries of Lake Michigan, the St. Joseph and Grand Rivers of Michigan and the Fox River in Wisconsin, bring to Lake Michigan 11,500 cubic feet of water per second. The Chicago Sanitary District has created a channel that takes away almost the equal of the flow of those rivers, 10,000 feet a second. It is not necessary to demonstrate, by figures or in any other way, that there is a lowering of the lakes. That fact is patent from that statement. I use the Government engineers' reports.

The State of Illinois owns to the boundary line in the center of Lake Michigan; along a shore line of some 60-odd miles, about 30 miles out, is the boundary line as prescribed by the enabling acts of Congress. There is an area of about 2,000 miles. The State of Michigan has an area, according to the figures furnished by the International Waterways Commission, of some 22,000 miles of those waters. Illinois, with an ownership of ten per cent, practically, of those waters, presumes to own all of them.

I do not believe that is the law. I believe, as this Court enunciated in the *Port of Seattle* case against the Oregon-Washington Railroad Co., that Michigan owns every foot of water within her boundaries, subject only to the right of the Federal Government to use those waters for navigation.

And I do believe that, when the Federal Government takes the waters, or uses the waters, for navigation, it should, in its wisdom, use those waters to improve the navigable system in which they are found, rather than to transport them to another navigation system, which is watered by the great Father of Waters.

We do not envy Chicago her growth and prosperity. We claim, however, that Chicago should respect our rights. We do claim that there is an ample way to take care of this sewage without a diversion of our property, if the Court please.

I do not think, in view of the shortness of the time, that I will take the time allotted to me, but will leave it to the Government counsel. But I do want this Court to understand that all the people of Michigan, and the people of the other States, have been for years vastly interested in this subject; and that they deem this an invasion of their rights.

Thank you.

Argument of Harvey D. Goulder, Esq., counsel for The Lake Carriers' Association, amicus curiae, in favor of appellee.

The Chief Justice: Mr. Goulder.

Mr. Goulder: May it please your Honors: My time is limited, and I will not take more than ten minutes in stating some of the points that the Solicitor General has asked me to make.

I filed as *amicus curiae* a short brief, which I trusted, from its very brevity, might take the interest of the Court sufficiently for them to read it. And in that brief are citations, I think, of testimony and the principal legal authorities that are of moment in this case.

Of course, with the Solicitor General, I share the feeling of doubt as to what is the position of the other side. But I take it from their answer, which denies that they ever recognized the authority or the right of the United States Government to interfere in any manner, either with the construction, or with the quantity of water to be taken from Lake Michigan; and the fact that their statute of Illinois creating the district said that, if a channel were erected which connected the DesPlaines River, it should be a navigable channel, and that the United States in that case would be authorized to have control over it for navigation purposes, but not to interfere with its use for sanitation and drainage purposes—I take it that that is their position.

Now, counsel on page 94 of the reply brief says that they have a right to use the navigable waters of the United States for the local interests as determinined by the local authorities.

The President of the Sanitary District stated—and he is quoted in Secretary Stimson's report and decision—that it was pernicious to suppose that 10,000 cubic feet should be the limit, and that they were entitled to all the water that they might want or take, as their interests and their necessities for sanitation purposes required. On which the Secretary commented, as stated in my brief.

> "It is therefore quite conceivable that compliance with their sanitary needs according to this method of sanitation may eventually materially change this great national water course now existing through the Lakes."

I shall content myself with trying to picture very briefly what this commerce is that we are talking about.

Here (indicating on map) are the Great Lakes. Here is Duluth (indicating); here is Chicago (indicating); here are the Straits of Mackinac (indicating); here is the "Soo" canal (indicating), where there is a fall of 19 feet from Lake Superior.

There we have created that enormous commerce, so that through that canal there passes, during the eight months of the season of navigation, more than double the tonnage passing through the Panama and the Suez Canal.

Down here (indicating) we reach the foot of Lake Erie: and here (indicating) is Niagara Falls. Now, for our big ships, which are the great bulk of the trade, or nearly all of the trade, we are stopped at the foot of Lake Erie (indicating).

The records show (and the testimony in this case bears it out) that the large ship of the Great Lakes is 600 feet

or a little more in length, about 55 feet beam, and about 32 feet of molded depth—

The Chief Justic. 32 feet of what?

Mr. Goulder: Molded depth; that is the depth from the top to the bottom of the ship. These ships would draw 22 or 24 feet of water with perfect safety.

And in the evolution of the Great Lakes, and in this enormous business, the ship that does not carry more than 10,000 tons is either obsolete or rapidly becoming obsolete. It is also the subject of testimony in the case, and in the official reports transmitted by the Secretary of War—and I made references to those in my brief—that these ships, all of them, load to 20 feet, or can load to 22 feet or more. They say—just let me read it; it will be quicker than paraphrasing it:

> "The Great Lakes system forms one of the world's greatest highways for water-borne transportation. The Great Lakes fleet moves more than 100 million tons of freight each season. These vessels are from 280 to 265 feet in length"—

Nearly all of them in this trade now are 500 feet or more in length—

> "and have a carrying capacity of from 3,000 to 15,000 short tons. Most of them can be loaded to a draft of about 22 feet. They are the most economical carriers in the world, their rates usually being less than one-tenth of a cent per ton-mile, and sometimes only a third of that amount. Rail rates are several times as much, often being at least ten times the water rates. The annual saving over the cost of moving this same freight by rail exceeds a quarter of a billion dollars."

A quarter of a billion dollars saved to the public each year. I would estimate that at nearer half a billion.

Now, some more facts about this: We have some maps here showing the movement of iron ore. Our industrial supremacy is largely based on iron and steel. Eighty-six

per cent of all the iron and steel made in the United States is from the ore that comes down this waterway;—and an English committee reported years ago that we never could rival England in that respect, because, while we had the raw material, the cost of transportation would always be prohibitive. The cost of transportation is now about one-fifth what it was at that time; and that has built up this entire industry, which with all of these millions of men employed and billions of dollars invested, is dependent upon this waterway.

I may illustrate further: In the statistical book of the War Department—which they started issuing since your Honor the Chief Justice was there—they get their statistics from the different districts and put them all together, combining them—showing all the foreign, domestic and internal commerce; and they show that, of all of the water-borne commerce of the United States on all of the coasts and all the internal waterways, 27 per cent is carried over the Great Lakes. It is more than the total of the foreign commerce in and out of the United States, on both coasts. It is about 45 per cent of all the foreign and coastwise trade of the Pacific, the Gulf and the Atlantic coast.

That is the story,—I wish I had time to dwell on it—of what this great water route is which they threaten, and which the Government is trying to conserve.

The Chief Justice: Can you tell us, Mr. Goulder, or have you figured upon it, how much loss would be entailed to this navigation in any way by the lowering of the level of the Lakes six inches?

Mr. Goulder: Yes, your Honor, my two points succeeding this, which are the only ones I want to bring out—and I will do so as briefly as I can—will indicate what the injury is and what the loss is due to that lowering of the level.

Now, the effect of taking a large body of water out from Lake Michigan in reducing levels it is not necessary to prove.

I should say that the proof is ample and all one way, and I cited it on page 25 of my brief. It is uncontradicted and indisputable evidence. It is shown by the records of the War Department, and by the testimony of various witnesses who were called in the case.

In particular, there was a witness named Shenahan, who had a great deal to do with the Coast Service; and he said that the taking of 10,000 cubic feet of water per second from the lake would reduce the level of the lake 5½ inches. Now, up in the Lake Region, we all call it a half a foot—six inches—that is, in Lake Michigan and Lake Huron, which really, as you will see from the map (indicating) are one body of water. There is just the Straits of Mackinac separating them; and the effect would be the same on Lake Erie; below that, it has a greater effect; and on the Lower St. Lawrence River—where they are talking about a "Lakes to the Atlantic waterway"—the diminution is probably a foot.

Now, the appellants recognize this. They deny that there is any diminution. But they recognize it in the proposal for works of some time to compensate for the lowering.

I cannot conceive that question of compensation to be involved in this case. But they recognize the diminution. And the court below held as to this, that the carrying capacity of these 22-foot ships is affected in the result, seriously affected, even by the excess over 4,167 feet that the Sanitary District is using.

I cannot take further time in the discussion of that, but must come to this point: That everything shows this: The testimony is clear and it is unequivocal in this regard, and is confirmed by every report of the Government that can be cited: That one inch of water means from 75 to 100 tons of cargo capacity loss.

So that six inches diminution of water would represent from 450 to 600 tons of freight on every loaded trip on every

one of the ships that have been engaged in this enormous business. I am speaking now about the bulk business—I mean ore flux, stone, grain, of which we carry 500 million bushels in a season, and coal, which is about 30 millions.

And the ship that is not so affected by every inch of reduction of water is either, as I have said, obselete or nearly so.

And may I illustrate: The effect of that reduction of level is just as if the Sanitary District were to go out and spread a floor over the bottom of all that system, five or six inches deep. There is absolutely no difference between raising that in all these critical places—all these channels where the Government has spent $100,000,000 in improvements; it has spent $20,000,000 at the "Soo," which has this enormous tonnage going through it—and lowering the level of the Lakes.

And the lake system is shown by all these reports, and is world-known, as furnishing free, open, unrestricted, competitive transportation—the deepest and most efficient in the history of the world. The Detroit River, according to the reports and the testimony, is the most used water course in all the world. Now, that is what the testimony shows. And aside from my statement here, it is shown by Government reports which are cited in the Government brief and in my brief; it is shown beyond peradventure; and there is not anything in the evidence to the contrary. It is indisputable that that is the effect.

Now, what is the result?

We lose 100 tons—no, I am wrong: On sixty out of some 400 ships engaged, we lose 100 tons an inch, or 600 tons for six inches of lowering of level. On the ships coming next to those, we lose between 500 and 600 tons with six inches lowering.

Now, as to what that loss consists of. I say there are two losses: The direct loss to the ship in freights; and the loss to the general public.

On the question of loss, the Solicitor General said that the lowest estimate ever heard, or ever appearing in any report that was ever mentioned—not appearing in any report, but ever suggested by anybody, was $1,000,000 a year from this diminution. And the Government report says it is at least a million and a half.

Now, aside from the other testimony, which is collated and cited under that head in my brief, there is this—and it is uncontradicted by any syllable of testimony in this case:

Mr. Livingston, the president of the Lake Carrier's Association, was asked to go into it thoroughly and compute the annual loss; and he gives the figures and the reference to volume 1 where his testimony is contained, is in the brief—he gives the figures, and the result at a low estimate he gives as $500,000 per inch. That would be $3,000,000 a year in direct loss of freights through this reduction of the lake levels.

Now, I assert that that testimony of Mr. Livingston, was gotten up with care, and that low figures were taken; he was very careful; he gave his figures, and they show a difference of $500,000 per inch. Now, there is a typographical error in the brief which makes my statement a little garbled; but it was all progressive, with the increasing traffic and size of the ship; and I make the estimate in my brief that, by now, that loss cannot fairly be considered to be less than $4,000,000 a year.

Now, the loss to the general public has been spoken of. There are all the mines, the docks, the elevators, the shipbuilding plants, etc.; then, down below us are all the furnaces; and there is everything involving any ramification of the iron business, or anything made of iron or steel.

There are millions of people spread all over this country; and they are all interested in—what? That we may be able to continue to give the answer to the British committee that we

have heretofore given by our performance—that we can and we do carry this iron ore down at the phenomenally low rates which I have stated, and of which the reports are full, and that that does enable this country to take its preeminent position where we make more steel and iron than Great Britain, France and Germany combined; and 80 per cent of it is made out of this ore, because of this cheap transportation route, without which that could not be accomplished.

And so it is as to all the grain of the Northwest: I spoke about 500 million bushels of grain coming down at these low prices. And there is the coal going up at these low prices, always away below the rail rates; the rail rates for carrying such freight always being more than five times as much, and as the Government report shows, often being ten times as much as the rate by this water route.

May I in closing say this further? That, taking the commerce of the Great Lakes, the Government computations are all based on an average haul of these bulky freights, or bulk cargoes of a little over 100 miles. The total length of the haul from the head of Lake Superior to Lake Erie is approximately a thousand miles. The ton-mile performance of this transportation route equals 25 per cent of the ton-mile service of all the railroads in the United States and it is nearly one-half as great as that of all of the railroads east of the Mississippi and north of the Ohio River.

Now, I submit that when counsel come in on the question of the action of the Government—and I am frank to say that I question the right of Congress to shake off the trust which it has. I question the right of Congress—I do not know that this is involved in this case—or of any authority in the world, with that trust fastened upon those waters, and fastened upon the other hand upon the general government of the United States for navigation and commerce—I question whether there exists anywhere authority to permit the diversion of those waters for sewage purposes or sanitary purposes, or

anything else than navigation purposes. And in that connection there are in the record reports showing that 1,000 cubic feet per second of water is ample for any channel that they could have that would comport with the general Mississippi transportation. They recommended a depth of eight feet for the channel, which might be increased to nine feet; and it is shown conclusively that 1,000 cubic feet per second is enough water for that.

And we have a right, our ships and our people—and I speak not only for ships, but for the cognate interests connected with the transportation part of it—the carriage of all this ore, grain, coal, and everything of that kind—we have a right to come in and say that Chicago may not say, with regard to these interstate and international navigable waters, put in charge of the United States: "We do not recognize the authority of the United States at all in the matter, in any shape or manner. They have no right to say anything, and no authority to say anything about how we do it or how much water we take. If we make a navigable channel, why, we will let the United States come in and regulate the navigation end of it; but they must not interfere with its use for these non-navigation purposes."

And to further say, in the face of the fact, as acknowledged by their own action as stated here by counsel, and as shown in volume 8 of this record, that they are making purification plants. They can do it; and the testimony shows that they took care of 800,000 population; and the highest authority in this country says that urban sanitation, or urban sewage, may be cared for to any desired limit by these shore scientific modern methods. Because we had sanitary engineers, and members of the American Society of Civil Engineers testify, and their testimony dissipated any old idea that this is in any experimental stage and cannot be done.

I refer to Harrison B. Eddy, of Boston, one of the leading sanitation authorities in this country.

And I went further to say as to the local interests that they talk about,—that is that the State or local interests may regulate the water to the exclusion of the United States or anybody else, that there are two things to be thought of: In the first place, they are manufacturing power as the result of this diversion. Their engineer testifies—and I have cited the page in my brief, that they can manufacture power with that flow of water to the value of $2,750,000; and they do manufacture power; and that that power is used in the reduction of expenses, or sold in the reduction of expenses.

Now, a local interest, then, is using this antiquated, discarded, open sewer plan, because it is cheaper than other methods, and they can still further cheapen it by the manufacture of power if they can get plenty of water.

And there is one other consideration: That during all the time of this controversy, the Chicago packers, and a certain foreign products plant, have been pouring the filth of a most unsanitary character (because it has so much of solids) into this sewer, to the extent which they themselves admit—and you have heard the counsel say it—would represent the ordinary sewage of a million and a half inhabitants.

Argument of Joseph B. Fleming, Esq., on behalf of appellee.

Mr. Fleming: Just a few words, if your Honors please, in conclusion of our side of the case; and I shall supplement very briefly the admirable presentation of Mr. Beck on behalf of the Government.

The bill in this case charges, briefly, that this diversion at Chicago did create an obstruction not affirmatively authorized by Congress to the navigable capacity of certain waters of the United States.

The bill charges also, after a recital of the facts, that they sought to alter and modify the course, the condition and

capacity of the two rivers, without work having been recommended by the Chief of Engineers and authorized by the Secretary of War.

Your Honors asked yesterday as to the findings of the trial court. Very briefly, they are these—and the findings are in the record: That this diversion at Chicago did result in a lowering of the levels of the Great Lakes and their connecting waters. That this diversion would constitute and did constitute an obstruction to the navigable capacity of the Great Lakes. That the defense of sanitation was untenable, and those portions of the answer setting forth the defense of sanitation should be stricken out and an injunction should issue.

Judge Carpenter rendered an opinion, which is also incorporated in this record, in which he says, "I have read this entire and I am in complete accord with what Judge Landis found."

Now, we get back in this case to Section 10; and counsel for the Sanitary District has sought to find an affirmative authorization by Congress.

They have told your Honors that there is no statute covering the Chicago diversion; that is stated by both counsel who have addressed the Court thus far.

And they have called the attention of your Honors to the Niagara Falls Act of 1906, a piece of legislation directed primarily to the necessity of the preservation of scenic grandeur, and to protect against further depletion of the Falls. They call attention to that act and tell your Honors that Congress indicated by that enactment of that law an intention to legislate specifically, and that the general legislation of March 3, 1899, is not effective.

Now, in that connection, I want to call attention very briefly to the *Rio Grande* case, for this reason: It sets forth the definition of what constitutes an obstruction within the purview of this act.

The court, after calling attention to section 10 of the act of 1890—and by the way, that is identical with this act, so far as the particular section is concerned, except that it says, "authorization by Congress" in the act of 1899; and an "authorization of law" is required by the act of 1890.

Referring to section 10 the court said:

> "As this is a later declaration of Congress, so far as it modifies any privileges or rights conferred by prior statutes, it must be held controlling, at least as to any rights attempted to be created since its passage; and all the proceedings of the appellees in this case were subsequent to this act. This act declares that 'the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters in respect to which the United States has jurisdiction, is hereby prohibited.'
>
> "The language is general, and must be given full scope. It is not a prohibition of any obstruction to the navigation, but any obstruction to the navigable capacity; and anything, wherever done or however done, within the limits of the jurisdiction of the United States, which tends to destroy the navigable capacity of one of the navigable waters of the United States, is within the terms of the prohibition."

I will read just one sentence from the *Economy Light & Power Co.* case.

Mr. Justice Holmes: Do you mean that case in 256 U. S.?

Mr. Fleming: Yes, sir.

> "But as recognized in the *Gilman* case, 3 Wall. 713, Congress may exercise its authority through general as well as through special laws, the power in either case being supreme. The act of 1899—"

The act under consideration—

> "Is a due assertion of the authority of Congress over all of the navigable waters within its jurisdiction, and it must be accorded full weight."

We cited other cases in our brief upon the same subject.

They seek to tie themselves to the two old acts of Congress, the act of 1822 and the act of 1827, and invoke those statutes as a justification for their proceedings here—for the construction of the canal and the diversion at Chicago. Just a word or two, if your Honors please, with respect to that:

The act of 1827 provided that the canal should be commenced within five years and completed within twenty years. Three years later, if your Honors please, as showing the purpose of Congress, the Congress passed an act authorizing the State of Illinois to construct a railroad between the points in question, showing conclusively the purpose Congress had in mind.

This matter was before Secretary Stimson and he covered the situation in his opinion of January 8, 1913, finding that the only purpose was the purpose of navigation and that sanitation was not considered.

One thing more: That act, if your Honors please, provides for the creation of a particular canal the location of which was to be determined by law, and was subsequently determined. It is not claimed here by appellants that the canal they constructed is within the ninty-foot zone reserved on either side of the old forty-five-foot canal. This canal is a distinct, separate proposition. An authorization from Congress to construct a bridge across the Ohio River at a certain point is not an authorization to construct two bridges a mile apart.

They told your Honors yesterday and they told your Honors again this morning, that the old Illinois and Michigan Canal has been abandoned and replaced by the new one. They say "We have built another canal alonside the old one."

Now, what are the facts? If your Honors please, on July 1, 1919, the State of Illinois passed this act, which I am going to quote briefly. This act became effective on July 1, 1919; and section 3 of the act—and by the way, the Sanitary

District of Chicago has its own board of trustees elected by the people. They have jurisdiction over their canal—the Sanitary and Ship Canal; the other canal is under the control and direction of a State board.

Section 3 of this act of 1919 reads as follows:

> "The Department of Public Works and Buildings of this State is authorized and directed to protect against and prevent encroachments upon said Illinois and Michigan Canal, throughout its entire course as originally constructed, and to preserve its navigable capacity throughout the entire course. And it may, when the permission of the Federal Government is obtained, change and improve said canal and provide terminal facilities. No permission heretofore or hereafter granted which results in the obstruction to navigable capacity of any portion of said canal, or interferes with its use for any of the purposes herein named, shall operate in any way to deprive the State of Illinois of its rights."

The only right, if your Honors please, that the Sanitary District has in that canal is to cross it at certain portions, the portions specified. Their contention in this respect was disposed of likewise in the *Rio Grande* case. They raised a similar contention there, if your Honors please; and the Court answered that contention there.

One thing more: That canal was for the purpose of navigation, and not sanitation. And the record shows, if your Honors please, that 1,000 cubic feet per second is adequate for all transportation or navigation purposes. That is the finding, too, of Secretary Stimson.

There is nothing, if your Honors please, in this record, showing that the Sanitary District has any right under the act of 1827. The State of Illinois has not conferred any right upon them. The Illinois Legislature, in the enactment of the law to which I called attention, effective July 1, 1919, negatives any such delegation.

Mr. Kirby told your Honors this morning that the works constructed by the State of Illinois affected only waters within the State of Illinois, if I understood him rightly.

The fact is that the Chicago diversion is equal to the contribution of all the tributaries of Lake Erie; it is five per cent of the volume of water which passes over Niagara. It is five per cent of the total contribution of Lakes Michigan, Superior, Huron and Erie. Is not that fact, in and of itself, sufficient to show a "modification of the condition, course, and capacity of the navigable waters of the United States?" Now, if your Honors please, the evidence in this case is replete as to the effect upon the Lake levels; the reports of governmental committees and official bureaus have been presented in evidence; there are the reports of the International Waterways Commission; there are two reports—

Mr. Justice McReynolds (Interposing): Mr. Counsel, how far have we got to look into that question of fact? What is your case really bottomed upon here? Is it not bottomed upon the right of the Secretary of War to control this situation?

Mr. Fleming: Yes, your Honor.

Mr. Justice McReynolds: Now, could the Sanitary District go behind his decision?

Mr. Fleming: No. That is our contention. We contend that in our brief as well.

Mr. Justice McReynolds: I am trying to see, then, what we have got to do with the question of fact as to whether the water in the Lake is lowered or whether it is not; that is the thing I would like to have you enlighten me upon.

Mr. Fleming: Well, I do not know; but in the light of the inquiries propounded by your Honors this morning, I thought I had better discuss that question.

Mr. Justice McReynolds: Well, I want to know what we have to do with that question? Well, is it not your conten-

tion that the Secretary of War prohibited this thing, and had a right to prohibit this thing?

Mr. Fleming: Yes.

Mr. Justice McReynolds: And suppose the Secretary of War had taken no action at all: Would that make any difference?

Mr. Fleming: Yes. Independently of that statute, your Honor, the Government had a right to protect the navigable waters of the United States.

Mr. Justice McReynolds: Without any statute?

Mr. Fleming: Independently of any statute.

Mr. Justice McReynolds: But does the United States set up that right here in this suit?

Mr. Fleming: Oh, no; this proceeding here is predicated upon section 10 of the act of 1899.

Mr. Justice McReynolds: Well, is not that your whole case?

Mr. Fleming: We have a bill here which covers the situation independently of the statute, in my judgment.

Mr. Justice McReynolds: What do you mean by "a bill here"?

Mr. Fleming: We set forth the impairment of the navigability of the Great Lakes, by withdrawal of the water at Chicago—a situation which would warrant relief to the Government, independently of the statute—no, answering your inquiry further—

Mr. Justice McReynolds (Interposing): Is that the ground upon which the United States is proceeding here?

Mr. Fleming: No; we are proceeding, if your Honor please, on the theory that there is an obstruction to the navigable capacity of the Great Lakes, "without affirmative authorization of Congress"; that the "course, and condition" of cer-

tain navigable waters of the United States have been altered and modified—

Mr. Justice McReynolds (Interposing): Yes; but we have to decide this case upon the issues that you have raised.

Mr. Fleming: Those are the issues.

Mr. Justice McReynolds: And I was trying to see whether you have asserted the broad power of the United States irrespective of any statute?

Mr. Fleming: No, we do not. We argue that in our brief, but we have not put that in the pleadings. Our bill is predicated upon section 10 of the act of March 3, 1899.

The Chief Justice: As I understand your argument, it goes to the point that, even if the objection of the act of 1899 does not apply in giving a remedy by injunction, you still have that remedy growing out of the relations between the parties?

Mr. Fleming: Yes; and this Court has so held in the *Wheeling Bridge* case, to which the Solicitor General has referred; and we cite numerous other cases in support of that proposition. Independently of that statute, we have that right.

Well, I will not present any further reports or proofs or excerpts from the records in connection with the elevation of the lake levels, nor in connection with the injury to navigation, unless your Honors will so indicate. I have here excerpts from reports showing injuries to navigation, as testified by witnesses and found by commissions; but unless your Honors so indicate, I will not refer to them further.

Mr. Justice Holmes: You have cited them in your brief, have you not?

Mr. Fleming: We have cited them in our brief.

One word, then, with reference to the current, the excess current in the Chicago River: Counsel have told your Honors that no evidence was presented in regard to the current

in the Chicago River until after the evidence was in; that it was plainly an afterthought. Mr. Kirby told your Honors this morning that the proof was conclusive that there was no current in the Chicago River injurious to navigation.

Now, what are the facts? The bill involving the Chicago River was filed on October 6, 1913; and the bill in the Calumet River suit was filed on March 23, 1908. And this testimony showing the excess current in the Chicago River was presented on April 8, 1914. And that testimony, if your Honors please, is unanswered in this record. The testimony with respect to the excess current in the Chicago River was that of ship captains and navigators, men who traversed the Lakes and the Chicago River for years. Their testimony was that the current was from two to six or seven miles per hour—something away beyond what has ever received the semblance of permission of the Secretary of War.

They all testified to the prejudcial effect upon navigation; that it was exceedingly difficult and dangerous, in view of that excess current, to navigate the Chicago River. We set forth the details of that testimony on page 115 of our brief —commencing there.

They call your Honors attention to governmental reports and surveys. They call attention to the fact that fifteen different acts of Congress have recognized this canal; that appropriations have been made for investigation. And each and every one of those contentions have been answered in the *Wheeling* case—and by the way, the *Wheeling* case is a complete answer to each and every contention raised in this case. We do not need to go further than the citation of that case.

The testimony shows, if your Honors please, in the first branch of the case, namely, the obstruction, that there has been a lowering of the levels of the Great Lakes; that that reduction amounts to five or six inches. Secretary Stimson found six and nine-tenths inches, if I am not mistaken. But

there has been a lowering of the levels of the Great Lakes, due to the increase of current in the Chicago River.

Those two propositions constitute an obstruction to the navigable capacity of the waters involved. We do not need to show an obstruction under this statute. The language is comprehensive. All we need to show is a modification. And we have shown, as the record shows, the creation of a large navigable stream flowing away from Lake Michigan and discharging its waters into another watershed.

The record shows a change in the condition of the Illinois River and the DesPlaines River—plainly a change in the condition of these navigable waters of the United States. The case is determinable, as Mr. Beck said, on the pleadings, without reference to the proof.

Congress enacted in 1890, and again in 1899, these acts; and the ultimate question is, have the acts of appellant been permitted, or have they been done pursuant to Federal laws? The record establishes conclusively, if your Honors please, that they have not.

In *Missouri* v. *Illinois,* to which counsel alluded yesterday, this Court said:

> "It is a question of the first magnitude whether the destination of the great rivers of the United States is to be the sewers of the cities along their banks. Obviously, of far greater magnitude, is the question whether the waters of the Great Lakes are to be subject to the unrestricted depletion by the States and cities, without regard to navigation purposes, and whether the once paramount right of Congress over navigation is to be made subordinate to the claims of the States."

Now, in view of the record in this case, if your Honors please,—and there is not any controversy about the lowering of the level, but the only controversy is about the extent of the lowering; the only thing as to which there is any dispute in the evidence, is as to the extent—we submit that we are entitled to an affirmance of the decree.

Closing argument of Edmund D. Adcock, Esq., on behalf of appellant.

Mr. Adcock: If the Court please: In the time left at my disposal, it will be impossible for me to take up every point that has been argued here in opposition.

The Chief Justice: You only have about ten minutes left.

Mr. Adcock: Yes. I submit that our reply brief takes up, I think, in consecutive order, the arguments made in the brief of the Government.

There are one or two things to which I would like to call the Court's attention.

It seems to me that the fundamental proposition here is the question of the State's power, in the absence of any act of Congress occupying the same field. That is the whole question. And that until Congress acts, then this power, which is in the interest of public health and under the police power, remains. And we are not denying the right of Congress specifically to legislate upon that subject.

Mr. Justice McReynolds: Well, before you finish, I wish you would tell me, if you do not mind, what kind of decree you would like to go down to the court below, if this judgment is affirmed?

Mr. Adcock: If I may have the opportunity to do so.

Mr. Justice McReynolds: Yes, I just suggest that to you.

Mr. Adcock: We stand upon our fundamental rights that the action of the State of Illinois here providing for the protection of the Health of its citizens, is absolutely valid until Congress has acted. And when it does act, it must act in those plain and unmistakable terms—

The Chief Justice (Interposing): Then your contention is that the enlargement of the diversion to 10,000 cubic feet a second was lawful?

Mr. Adcock: Absolutely lawful.

The Chief Justice: And is still lawful?

Mr. Adcock: And is still lawful. And that section 10 of the act of 1899 does not in those terms forbid it—in the terms that are required in order to forbid the action of the State—

Mr. Justice Holmes (Interposing): Your contention might involve this: Do you not think that if the State of Illinois has the power to enlarge it, some other State would have the power to take water in the same way?

Mr. Adcock: If the Court please. That is not the issue in this case.

Mr. Justice Holmes: I am quite aware that that is not the issue; but I was speaking of the breadth of your statement.

Mr. Adcock: Our contention is that, so far as the United States is concerned, so long as the State of Illinois is acting reasonably in the interest of its public health, then that action remains lawful, unless Congress has clearly and unmistakably stated its intention otherwise.

Mr. Justice Sutherland: No matter how much it interfers with navigation?

Mr. Adcock: So long as it is reasonable. In the case of *Hennington* v. *Georgia,* the court sustained the action of the State against the operation of trains on Sunday, both interstate as well as others. The *Covington Bridge* case, to which counsel refers, involved the fixing of tolls over a bridge directly operating upon interstate commerce.

We are not acting in defiance of the United States so far as commerce is concerned. We are acting within the sphere of our powers; and until Congress under the commerce clause forbids us, our action is lawful.

And not only has it not forbidden us, if your Honors please; but it has taken action which clearly recognizes this diversion; it has taken such action from the very time that this act was passed; and when the Sanitary District expressed its purpose to occupy the Chicago River for this supply channel,

Congress immediately provided for the improvement of the Chicago River in connection with appellant's improvement of the South Branch and the West Fork. On April 1st—

Mr. Justice VanDevanter: Well, there would not have been any objection to your doing that anyway?

Mr. Adcock: It was what we were working for.

Mr. Justice VanDevanter: But there would not have been any objection to your doing that?

Mr. Adcock: The only corporate purpose that we had in doing that was in order to make that channel—in order to take that water through there; we had no other corporate power. And it was done right along.

And the very act, if your Honors please, which contains this section 10 contains in another section an item with reference to the Chicago River under which *Tunnel Cases* were decided, making a project depth of twenty-one feet, on condition that the local authorities should reconstruct the bridges and lower the tunnels at their own expense; and this court said that they meant in that case to give the congressional assent. The tunnels were removed, and it was held that the consent of the Secretary of War was unnecessary. We reconstructed the bridges that were expressly provided for in that act. We did also the excavation to deepen the channels, and to widen the channels.

And this court said, in *Missouri* v. *Illinois*, where this very diversion was involved, and where the question was the effect upon the Mississippi River:

> "In the case at bar, whether Congress could act or not, there is no suggestion that it has forbidden the action of Illinois."

And I refer you also to a case involving this very proposition, which I have mentioned before—this very permit—an opinion by Mr. Justice Baker, in our Circuit Court in the case of *Corrigan Transit Company* v. *Sanitary District*, 137

Federal Reporter; and I respectfully call the Court's attention to the Niagara Falls act, to the Burton act; and I do not believe that there is a possibility of reading that act without coming to the conclusion that what they intended to say there was that they had not given the Secretary of War authority to fix the quantity of diversions from the Great Lakes, and that they were not going to do so, but that that was something that might be taken up in the future. And there was no occasion to pass that act with reference to Niagara Falls, if the Secretary of War had the authority.

Counsel has referred to water power. There is not a syllable upon this record upon which it can be stated that this great work was done for the purpose of obtaining water power. It was not until 1903 that an act was passed specially containing the provisions with reference to the development of this power which would be incidentally created; and it would have been perfectly criminal for us to have gone ahead and used the water for sanitation purposes that was absolutely necessary, without using the power that had been going to waste and would go to waste unless we harnessed it up.

Now, Counsel has had much to say about the suit that was filed March, 1908, and I want to submit to your Honors, in that connection, that the contention in that respect is exactly the opposite of what counsel for the Government claims; and the necessary result or construction of what happened is exactly the opposite of what counsel claims. For in that case the Attorney General when he brought the suit only asked for an injunction against doing or attempting anything in any way "to reverse the flow of the said Calumet Rivers, and from doing or attempting anything in any way to divert or abstract any waters from Lake Michigan in any channel other than the Chicago River as already authorized by the Secretary of War, unless prior to beginning any of said work".

Now, what was the situation with reference to permits at that time? The Secretary of War and the Chief of Engineers, in construing this whole proposition, assumed that the only thing they had to do with was the question of the current in the Chicago River and how we would get this water from Lake Michigan to our channel. That was the engineering proposition.

So that the only condition that they ever placed upon us was with reference to the current in the Chicago River.

Now, what did we do? We have complied with the conditions of the May 8, 1899 permit—

The Chief Justice (Interposing): I do not understand you.

Mr. Adcock (Continuing): By improving the river so that there is no current in the Chicago River obstructive to navigation—

The Chief Justice (Interposing): Well, did the permit refuse you permission to use the Calumet River?

Mr. Adcock: The Calumet River is not involved, your Honor.

The Chief Justice: I know; but it is there, is not in the suit of 1908? Is it not referred to there?

Mr. Adcock: Yes. If I may, I will just continue and carry that point through:

At that time, we had a War Department permit of July 11, 1900, to improve and enlarge the Chicago River so as to get a greater quantity through. That is, the work of deepening the river from seventeen to twenty-six feet and widening it, etc., was then authorized by the Secretary of War. The work was under way. The *Tunnel Case* was not decided until 1906. The work of deepening and widening the river was not completed until 1912.

Now, on September 11, 1907, when we got a permit for the North shore channel, there was a condition that the taking

of water should not exceed what was given by other War Department permits. It was necessarily assumed that when we had completed that improvement of the Chicago River, the permit or the right—the thing that would follow from that, namely, taking the water through, would be completely authorized.

So that, when the June 30, 1910, permit was issued, there was a condition that it should not exceed 4,167 cubic feet a second; and the purpose of that limitation was that, if they gave us that permit, we would not have any more than we had right to take through the Chicago River, because that proposition was in litigation.

And there was also in the permit a condition that it should not be used in litigation. In other words, it was a case of having a *modus vivendi*—due to a feeling that the channel had to be constructed. And there was a suggestion in General Bixby's report that that additional amount should be taken through there in order to relieve the Chicago River, so as not to get too much through that river. So that that was one of the reasons.

So that after that permit was given under those conditions, the only question was as to the legality of the taking of the 10,000 cubic feet a second through the Chicago River. And it was not, I submit, until Secretary of War Stimson's opinion of 1913 that we had any idea or information—and the record shows that—that that amount would not be allowed through the Chicago River.

So that there was no delay. Judge Landis stated that the testimony on that proposition had occupied some time; and after 1910, the only thing involved was the right under the suit instituted in 1913; and the testimony, after we found that question was raised, was taken in 1913 and 1914; and the record does not disclose a single action taken by the Sanitary District to delay any of the litigation.

Now, as to the treaty proposition—have I over-stepped my time, your Honor?

The Chief Justice: Yes, you have.

Mr. Adcock: I beg the Court's pardon. Unless you will give me just a little more time—

The Chief Justice (Interposing): I cannot give you any more.

Mr. Adcock: Well, I am sorry to have done that. But I just submit that our reply brief does cover these different points consecutively.

(Thereupon, at 3:50 o'clock p. m., the Court proceeded to the consideration of other business.)

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WM. R. STANSB
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IN THE

Supreme Court of the United States.

OCTOBER TERM, 1924.

No. 161

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

UNITED STATES OF AMERICA,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES, FOR THE NORTHERN DISTRICT OF ILLINOIS.

BRIEF ON BEHALF OF THE STATES OF ILLINOIS, MISSOURI, LOUISIANA AND TENNESSEE, AND OF THE CHAMBER OF COMMERCE OF ST. LOUIS, THE MEMPHIS CHAMBER OF COMMERCE, THE NEW ORLEANS BOARD OF TRADE, THE NEW ORLEANS ASSOCIATION OF COMMERCE, THE MISSISSIPPI VALLEY ASSOCIATION AND THE CHICAGO ASSOCIATION OF COMMERCE, AS AMICI CURIAE, TO OPPOSE THE AFFIRMANCE BY THIS COURT OF THE DECREE BELOW; FILED BY LEAVE OF COURT.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1924.

No. 161.

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

UNITED STATES OF AMERICA,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES, FOR THE NORTHERN DISTRICT OF ILLINOIS.

BRIEF ON BEHALF OF THE STATES OF ILLINOIS, MISSOURI, LOUISIANA AND TENNESSEE, AND OF THE CHAMBER OF COMMERCE OF ST. LOUIS, THE MEMPHIS CHAMBER OF COMMERCE, THE NEW ORLEANS BOARD OF TRADE, THE NEW ORLEANS ASSOCIATION OF COMMERCE, THE MISSISSIPPI VALLEY ASSOCIATION AND THE CHICAGO ASSOCIATION OF COMMERCE, AS AMICI CURIAE, TO OPPOSE THE AFFIRMANCE BY THIS COURT OF THE DECREE BELOW; FILED BY LEAVE OF COURT.

INTRODUCTION.

This case involves a conflict between the sovereign power of Illinois and that of the United States, the decision of which is vital to the inhabitants of Chicago, and of vast importance to the people and commerce of the Mississippi Valley. It does not involve any issue between states, nor between any state and appellant.

The above named amici curiae are interested in the issues in the above-entitled cause, and are prejudiced by the decree below, in respect of navigation and of sanitation.

Navigation: All of these states and commercial bodies are interested in the preservation and development of the navigable channel that has long constituted a public highway or water route between Lake Michigan and the Gulf of Mexico,—consisting of the Chicago River that opens into Lake Michigan, the Sanitary and Ship Canal of Appellant linking the Chicago River with the Des Plaines and Illinois Rivers, and the Mississippi River.

For the adequate maintenance and operation of this water route, a diversion from Lake Michigan of at least ten thousand cubic feet of water per second is necessary, particularly in aid of that part of the route lying within the State of Illinois, and of that part of the route in the Mississippi Valley extending from the mouth of the Illinois River (about twenty-two miles above the City of St. Louis), to Cairo, Illinois.

The effect of the decree limiting the diversion to 4,167 cubic feet per second, would seriously impair and lessen the navigability of this existing water route.

The Mississippi Valley needs this water route first, for direct use at the low freight rates offered by all water or part water routes, and second, to furnish an available all water or part water route in competition with all rail routes, so as to reduce the competitive freight rates of the latter.

Sanitation: The effect of the decree, if enforced, would be to create a dangerous and intolerable public nuisance along this water route within the State of Illinois, because of the consequent inadequate dilution of Chicago sewage passing through this water way (Appts. Narr. St. pp. 190, 199, 200, 209, 377).

While the State of Illinois and its commercial interests,

are immediately and vitally interested in this feature of the case, the State of Missouri, particularly the inhabitants of St. Louis and of other Missouri communities along the Mississippi River, are also deeply concerned, and would be seriously prejudiced by the decree.

The danger that St. Louis and the State of Missouri expected from the Chicago sewage when Missouri sued Illinois in January, 1900 (about the time the present Sanitary and Ship Canal was being opened), 180 U. S. 208, 200 U. S. 496;—was prevented only because the quantity of water that has been diverted from Lake Michigan through the canal to dilute this sewage, proved to be adequate in quantity to dilute and purify the sewage. An insufficient dilution of this sewage, which would result from an enforcement of this degree, would inevitably create a public nuisance and spread disease, not only along this waterway within the State of Illinois, but also to the City of St. Louis and other Missouri cities and towns along the Mississippi River.

The States of Tennessee and Louisiana, while not materially interested in the question of sanitation as such, are interested in having this waterway throughout its entire length, maintained in sanitary condition for safe use, free from risk of disease, to those who use it in transporting freight and passengers.

STATEMENT OF FACTS.

To avoid unnecessary repetition, we adopt the statement of facts contained in the brief filed on behalf of appellant, and shall endeavor to state in this brief only such facts as seem essential to disclose the interests of these states and commercial bodies, and to support the contentions herein submitted on their behalf.

The "Continental Divide," or elevation of land separating the watershed of the St. Lawrence River from that of the Mississippi River, lies in the northeastern portion of Illinois, within the limits of appellant, a few miles from Lake Michigan. At its lowest part the Divide is only a few feet above the normal level of Lake Michigan.

Since the earliest time covered by local history, there was a natural navigable water route from Lake Michigan, across this Divide, into the Des Plaines and Illinois Rivers, and thence by the Mississippi River to the Gulf of Mexico (Appellant's Narrative Stat. 400, 403). In early days explorers followed this ancient waterway, and fur traders used the same route. There are records that during high water, a natural water connection existed between the Des Plaines River and the Chicago River within what is now the City of Chicago (Appellant's Narrative Stat. 407).

The existence of this water route led in 1818, to the inclusion within the new State of Illinois of what is now the northern portion of Illinois, together with a part of Lake Michigan. The object of this inclusion as stated in Congress was to gain a coast on Lake Michigan and thereby to connect Illinois, through the Lakes, with the States of Indiana, Ohio, Pennsylvania and New York; and it was also stated that:

> "The facility of opening a canal between Lake Michigan and the Illinois River, is acknowledged by every one who has visited the place. Giving to the proposed state the port of Chicago (embraced in the proposed lim-

its) will draw its attention **to the opening of the communication between the Illinois River and that place**, and the improvement of that harbor'' (App. Narr. St. 405).

The existence of this water route led to the beginning of the settlement at the mouth of the Chicago River, which was organized later as the Village of Chicago, in 1833, with an estimated population of three hundred and fifty (App. Narr. St. 265). This village grew into the present City of Chicago, and this growth was possible because favorable transportation facilities existed from the beginning, viz: the water route by the Great Lakes furnished easy access to other lake ports and to New York state; and the Des Plaines-Illinois River route furnished access to the growing State of Illinois and to the entire Mississippi Valley.

The existence of these water routes and the growth of the port of Chicago at their junction, led still later to the construction of many important railroads into Chicago, and made Chicago an important center of transportation by both rail and water.

In the early days of Illinois, transportation flourished on this water route, as it did on the Missouri and Mississippi.

But later, the rapid development of the Middle West and the resulting marvelous increase in its natural and manufactured products, stimulated the construction of a vast network of railroads that competed with each other, and paralleled and competed with these inland water routes. This extensive and intense rail competition, maintained under highly economic operating conditions, gradually overcame and lessened the water transportation, and discouraged the adequate maintenance of inland waterways, so that transportation over this particular waterway and throughout the Mississippi Valley, became reduced to a relatively small volume.

Then the World War threw its enormous burden of traffic upon the railroad transportation systems of the country,

which broke down under it, and in the light of their proved inadequacy, and of the large increase in freight rates that resulted from war and post-war increased operating costs, shippers again turned to the waterways for relief. Through this experience, the shipping world has come to see the folly of handling by rail heavy low-grade commodities, like grain, coal, lumber, ore, iron, etc., as to which quick delivery is not essential, and for which there may be available an all-water or part-water route with its substantially lower freight rates. So the value and need of our inland waterways has again become and is, a subject of live importance to the business world and to the Government.

During the War Congress recognized this need of inland waterways to supplement our existing railroad systems.

In the "Federal Control Act" ("An Act to Provide for the Operation of Transportation Systems while under Federal Control, for the just compensation of their owners, and other purposes," 40 Stat. L. 451), the President was specifically authorized (Sec. 6) to spend such amounts as he deemed necessary for the **utilization of waterways** and **the creation of water transportation agencies.**

In the "Transportation Act" of 1920, (41 Stat. L. 499), in Section 500, Congress declared it to be its policy: **"To permit, encourage and develop water transportation service and facilities** in connection with the commerce of the United States, and to foster and preserve in full vigor, **both rail and water transportation."**

And in the same Section it was made the duty of the Secretary of War, in aid of this policy of Congress, to investigate extensively and to report to Congress concerning all matters that might assist in the development of inland waterways.

And by Section 201, of the same Act, upon the termination of Federal control, all boats, barges, etc., **on inland waters,**

acquired by the United States pursuant to the Federal Control Act, were transferred to the Secretary of War" • • • who shall operate or cause to be operated such transportation facilities, so that the lines of inland water transportation used by or through the President during Federal control shall be continued, and assume and carry out all contracts and agreements in relation thereto, entered into by or through the President in pursuance of such paragraph, prior to the time above fixed for such transfer."

It was further made the duty of the Secretary of War under one of the specific provisions of this Section, to operate or provide facilities for water carriage on the Mississippi River above St. Louis.

Under these Acts of Congress, the Government created and is successfully operating a barge line freight service on the Mississipi and Black Warrior Rivers, known as the "Mississippi-Warrier Barge Line."

To further the development of this carrier, and to place it on a more stable basis, Congress passed the Act entitled, "An Act to Create the Inland Waterways Corporation, for the purpose of carrying out the mandate and purpose of Congress as expressed in sections 201 and 500 of the Transportation Act, and for other purposes," (Approved June 3, 1924.)

A corporation was formed to take over and continue this freight service and to "as soon as there is an improved channel **sufficient to permit the same**, initiate the water carriage heretofore authorized by law upon the Mississippi River above St. Louis." This corporation is controlled by the Secretary of War, who, under Section 3 (b) of the Act, shall not discontinue present facilities nor develop new lines without Congressional authorization therefor, though he may report recommendations concerning them.

That this Government owned large barge line has been and

is being successfully operated between St. Louis and New Orleans, is a matter of common knowledge.

By the creation and operation of this line the Government has provided a through freight service between St. Louis and New Orleans, and has demonstrated that such a service is practicable as a matter of navigation, and in competition with parallel rail lines. It has also proved to the farmers and producers of other natural products, and to the manufacturers and merchants, throughout the Mississippi Valley freight territories, that this ancient route to the seas, giving access to the markets of the world at water or part water freight rates, is sill available, practicable and economic. Its value and importance to the Mississippi Valley now and in the future, are limited only by the extent to which the Government is willing to maintain and make available these inland waterways.

In addition to these developments resulting from the proved inadequacy of rail transportation during the War, a further development has emphasized the importance to shippers in the Middle West, of improving water transportation on the Mississippi River and from the River to the Lakes.

The construction and operation by the Government of the Panama Canal and of Government owned sea-going freight vessels, opened the markets of South and Central America to the products of the Mississippi Valley, and also had a marked effect on the rail freight rates between the Middle West and points on the Atlantic and Pacific coasts. Until these developments, such limited water competition as existed, although important, had not had its full effect upon rail rates from coast to coast, and between coast points and the Middle West. But these developments caused a large volume of coast to coast traffic and of Middle West to coast traffic, to move wholly or partly by water routes and thus to be diverted from the rail lines. Coast to coast rail rates had always tended to

be lower than the combination rail rates to and from Middle West points, and this fact caused a constant conflict between the desire of the coasts for low transcontinental rail rates and the desire of the Middle West to obtain combination rail rates no higher than the coast to coast rail rates. This conflict resulted in much litigation regarding such rates, also in frequent amendments of the Long and Short Haul clause (Sec. 4) of the Act to Regulate Commerce; and another effect was to make the rail rates more inflexible and less capable of adjustment to meet changing commercial conditions.

Since the existence of an available water route to the Gulf constitutes today the only effective regulator of long haul rail rates, this Mississippi Valley waterway, having a connection (via Appellant's canal) with Lake Michigan, and an outlet via the Missouri River for the products of the vast territory traversed by the Missouri, and having large additional territories tributary to the upper Mississippi, the Ohio River and each of the navigable rivers that empty into the Mississippi south of Cairo, Illinois, is today a vital factor in the transportation facilities of the United States.

The shippers and receivers of freight throughout this important part of the United States, whose businesses developed on a practical equality of transportation cost with their seaboard competitors, are now suffering serious disadvantages in competing with other parts of this country and in foreign trade, because of adverse rail rates to the sea. The recent improvement by the Government of water transportation facilities in the Mississippi Valley and its declared purpose to improve inland waterways generally, alone promises relief.

It has also opened wide the door of reasonable hope and expectation, that this historic route from the Lake to the Gulf, and the Mississippi River itself, will not be made less

navigable than at present, but will be improved and enlarged in navigable capacity, so as to forever and effectively "unite the waters of Lake Michigan with those of the Illinois River," for the use of deep draft barges and other freight bearing vessels, suitable for modern navigation, and for the transportation of large volumes of freight in competition with modern freight trains.

The volume of water (10,000 cubic feet per second) that has been and is now being diverted through appellant's canal into the Mississippi River, constitutes a substantial portion of the river between St. Louis and Cairo during low water seasons.

By Act of Congress, March 2, 1907, (34 Stat. L., p. 1073) a special Board of Engineers was created, who made a survey of the Mississippi River from St. Louis to the Gulf. This Board reported to the Secretary of War, June 7, 1909, and their report is Document No. 50, Sixty-first Congress, First Session. This report shows that at low water stage, the Mississippi River from St. Louis to Cairo has a flow of only 33,000 cubic feet per second, including the water diverted from Lake Michigan, and that this addition of 10,000 cubic feet per second adds one and one-half feet to the depth of this part of the river during the low water months. At high water, the maximum flow at St. Louis was 1,146,000 cubic feet per second.

It is a matter of common knowledge that this part of the Mississippi River is difficult to navigate at low water because of numerous shifting sand bars and a shallow, shifting channel; and the above facts from the Engineers' Report show how substantial a part of the river during low water months is the water diverted from Lake Michigan, and how necessary it is to the maintenance and operation of this waterway.

Various depths (twenty-four, fourteen and nine feet) for this Lakes to the Gulf deep waterway, have been considered by the Government, by the State of Illinois and by others

interested. The public demand for a twenty-four foot channel and its desirability, were so potent that the improvement of the Chicago River and the construction of the main channel of the canal for a distance of thirty-six miles from Lake Michigan, to within a mile or two of Joliet, Illinois, were completed with a depth of twenty-four feet; (Appts. Narr. St., p. 296).

This provided a much greater navigable capacity than would have resulted had the canal been built merely for adequate sanitation purposes. For merely sanitation purposes it could have been built **"for only a fraction** of the cost that was necessitated in building a channel of the present dimensions, in order to fit it for navigation." (Appts. Narr. St., p. 391.)

Below Joliet (beyond the jurisdiction of the Sanitary District) the State of Illinois is constructing improvements and has asked the Government to co-operate to create a preliminary depth of fourteen feet to the Mississippi (230 miles), to be further deepened progressively as the need of navigation may require (Appts. Narr. St., p. 297), and the waterway now actually under construction is required by the Illinois Act to be of a depth of not less than 14 feet over mitre sills.

To maintain such a fourteen-foot channel through the State of Illinois, a diversion of 10,000 cubic feet per second is essential. (Appts. Narr. St., p. 298.) The Illinois Act of 1889, creating the Sanitary District, contemplated a depth of at least fourteen feet with a diversion of 10,000 cubic feet per second. (Appts. Narr. St., p. 298.) This plan was advocated by the Lake to the Gulf Deep Waterways Association, and Congress made a conditional appropriation to begin the work whenever an understanding should be reached with Illinois regarding a plan of co-operation. (Appts. Narr. St., 299.)

The Report of the International Waterway Commission

upon the Chicago Drainage Canal, Jan. 4, 1907, (App. Nar. pp. 505 to 529), states (p. 512):

> "It can hardly be doubted that the canal will eventually form a part of an improved waterway between the Great Lakes and the Mississippi River, though its full depth will probably not be required for that purpose. Congress has not adopted any scheme for this improvement, but by its direction a survey was made, and plans with estimates for a waterway fourteen feet deep were submitted, by a Board of Engineers in a report dated Aug. 26, 1905. The Board found that for a distance of about 100 miles from Chicago the improvement must be with locks and dams and as the quantity of water required would be merely that needed for the service of locks and other incidentals, the extent of the improvement of depth which would be obtained in that part of the route was without limit so far as it depended upon the amount of water available. For the remaining distance, about 223 miles, the improvement would be an enlargement of the open channel and the degree to which it was practicable was entirely dependent upon the quantity of water flowing. The Board assumed that the Chicago Drainage Canal would eventually be permitted to take 10,000 cubic feet per second from Lake Michigan, and it expressed the opinion that with that volume added to the natural low water discharge of the Illinois River, a depth of fourteen feet in the open channel could be maintained; also that if a much greater depth was to be secured, a much larger volume of water must be taken from Lake Michigan."

That improvement of navigation in the Illinois River depends on the volume of flow from Lake Michigan, is further shown by the following references to Appellant's Narrative and the documents there quoted: Letter of Division Engineer of Chicago (May 24, 1921; App. Narr, p. 50; Report of Col. Macond, Jan. 25, 1875; App. Nar. pp. 419-420; Report of Capt. Marshall, U. S. Division Engineer of Chicago, 1895 Appr. Narr. 463.

While the plan for a fourteen-foot channel seems to be the one generally accepted and favored as desirable to be accomplished,—the actual work being done by the Government

as shown by Rivers and Harbors Appropriation Acts, has been for the present maintenance of channel depths of: nine feet from the mouth of the Mississippi to the mouth of the Ohio; eight feet from the mouth of the Ohio to the mouth of the Missouri, and six feet from there to Minneapolis.

Since the low water flow between St. Louis and Cairo is only 33,000 cubic feet per second (as stated above), it appears that the 10,000-foot diversion from Lake Michigan constitutes at such critical times almost one-third of the Mississippi River between these points.

From the beginning, Illinois has assisted Chicago to utilize the peculiar advantages of its natural location in protecting its water supply and taking care of sewage, by diverting water from Lake Michigan.

The original plan for the construction of the Illinois-Michigan canal contemplated a flow by gravity from Lake Michigan. Owing to lack of funds this plan was not carried out but from the beginning water for the canal was obtained from Lake Michigan by pumping works. In the report made pursuant to provisions of the Rivers and Harbors Act of 1902 (App. Narr., p. 498), the history of this matter is summarized as follows:

> "Besides being a highway of commerce, the Illinois and Michigan Canal has from the beginning served to carry off the sewage of Chicago. The Chicago River has always been the main receptacle of the sewage of the City, and as the volume of the sewage has increased with the growth of the City, additional facilities for discharging it into the Canal have become necessary. When the Canal was opened in 1848, a pumping plant was established at Bridgeport, where it joins the Chicago River. In 1860, the capacity of this plant was nearly doubled, being increased to about 400 cubic feet per second. Later on the summit level of the Canal was cut down so as to provide a continuous gravity flow from the Chicago River and Lake Michigan. That work was completed in 1871 and the pumping plant abandoned. In 1883, a new pumping plant was brought into use, having a nominal

> capacity of 750 cubic feet per second, but it soon became evident that the discharging capacity of the old canal was quite inadequate to carrying the volume of water required to dilute the sewage, and that a new and greatly enlarged channel must be provided."

Cooley testified that when the Illinois and Michigan Canal was opened to gravity flow it had an estimated capacity of 40,000 cubic feet per minute, which declined due to a decline in lake levels to 20,000 feet per minute. Pursuant to a resolution of the Legislature in 1881, the City of Chicago erected pumping works with the capacity of not less than 60,000 feet per minute. (App. Narr., pp. 272-273.)

Chicago, from the beginning, properly availed itself of the advantages of its natural location. The present canal, therefore, is merely the final development of an historic plan.

In view of the Lake States' claim of damage to their navigation interests, the evidence which disproves the existence of any such damage should be noted.

The testimony on this point is uncontroverted. Joseph Ripley, one of the United States engineers, described in detail the basis upon which navigation improvements in the Great Lakes are made. (App. Narr., p. 154.) In the Acts of Congress making appropriations for navigation improvements, navigable depths are fixed in relation to what is known as a "reference plane," *i. e.*, a plane (or level) fixed by the Engineers at a certain definite number of feet and inches above sea level. Navigable depths are fixed by the Acts of Congress at so many feet below the reference plane. The testimony shows plainly that reference planes for navigation improvements in the Great Lakes were, in 1901 and 1903, reduced from six feet to a foot or more in order to allow for the lowering of the levels of the Great Lakes anticipated by the engineers to result from the Chicago and other diversions. This testimony demonstrates that the depths provided by Congress in improving navigation in the Great

Lakes were in fact produced to the full extent contemplated. For instance, in spite of the claimed lowering of the Lakes, where a 21-foot project was desired by Congress, dredging took place to such an extent that 21 feet was obtained after the lowering of lake levels had occurred.

THE ACTUAL ISSUES BEFORE THIS COURT.

In view of the extensive scope of the claims made in the brief for the Lake States, and of the numerous points presented in the briefs of the parties to this record, it is particularly important to keep in mind the **exact nature** and **very limited scope** of the issues presented in this appeal.

In this case the Appellant is enjoined by the decree "from diverting or abstracting any water from Lake Michigan * * * **in excess** of 250,000 cubic feet per minute," *i. e.*, 4,167 cubic feet per second. (Appts. Narr. St., p. 117.)

The bills rest the entire case for the Government on the theory that Section 10, of the Rivers and Harbors Act of March 3, 1899, renders unlawful the Appellant's works and the resulting diversion, because:

(a) The diversion of water from Lake Michigan creates "an obstruction to the navigable capacity" of the Great Lakes; and

(b) Under Section 10, of the Rivers and Harbors Act of March 3, 1899, no obstruction of any kind or degree can be created without the consent of Congress and the permission of the Secretary of War;

(c) Congress has not authorized this diversion, and the Secretary of War has permitted Appellant to thus divert **only** 4,167 cubic feet per second; and that therefore

(d) **All diversion in excess of said quantity is unlawful.**

It thus appears that this entire case rests upon Section 10 of the Act of 1899, and that the decree must fall unless it can be justified under this Act.

The above statements accurately summarize the averments of the bills on the points involved.

This is not a suit in equity to abate an alleged nuisance. It is not an original proceeding before this Court by the Lake States against Illinois to determine whether Illinois, as part owner of Lake Michigan, is making an inequitable or unreasonable use of lake waters, thereby causing substantial injury to the navigation interests of the other Lake States. It is not even a suit by the Government to abate this diversion at Chicago on the ground that it constitutes a substantial injury to navigability. Nor does the Government sue as a trustee for the benefit of the Lake States or the people.

The above analysis of the bills and decree shows that the single issue upon this appeal is **whether Section 10, of the Rivers and Harbors Act of March 3, 1899, renders unlawful any diversion in excess of 4,167 cubic second feet.**

This brief is filed by leave of court on behalf of these *Amici Curiae* because of the facts above set forth, to show that the decree below should be reversed.

BRIEF OF POINTS AND AUTHORITIES.

I.

INTRODUCTORY: THE QUESTION OF SOVEREIGN POWER AS BETWEEN THE UNITED STATES AND THE STATE OF ILLINOIS.

Missouri v. *Illinois*, 200 U. S. 518;
Columbus v. *Merc. Trust Co.*, 218 U. S. 645;
Covington Bridge Co. v. *Kentucky*, 154 U. S. 204, 209;
Montgomery v. *Portland*, 190 U. S. 89, 105;
Lake Shore R. R. Co. v. *Ohio*, 173 U. S. 285, 292;
U. S. v. *Rio Grande Dam Co.*, 174 U. S. 690, 702, 703;
Guttierres v. *Albuquerque L. & I. Co.*, 188 U. S. 545, 553, 554;
Boquillas L. & I. Co. v. *Curtis*, 213 U. S. 339, 344, 345;
Willamette Iron Bridge Co. v. *Hatch*, 125 U. S. 1, 8;
Escanaba Trans. Co. v. *Chicago*, 107 U. S. 678, 683;
Cummings v. *Chicago*, 188 U. S. 410, 430.

II.

BEFORE CONGRESS HAD ACTED AT ALL ON THE SUBJECT OF OBSTRUCTING NAVIGABILITY, ILLINOIS WAS FREE TO AND DID EXERCISE ITS SOVEREIGN POWER OVER THESE NAVIGABLE WATERS WITHIN ITS OWN BOUNDARIES, BY BUILDING A CANAL TO "UNITE THE WATERS OF LAKE MICHIGAN WITH THOSE OF THE ILLINOIS RIVER," AND IN THE OPERATION OF THIS CANAL, FOR THE DUAL PURPOSE OF NAVIGATION AND SANITATION, ILLINOIS SINCE 1848 HAS CONTINUOUSLY AND LAWFULLY DIVERTED WATER FROM LAKE MICHIGAN.

Covington Bridge Co. v. *Kentucky*, 154 U. S. 204, 209;
U. S. v. *Rio Grande Dam Co.*, 174 U. S. 690, 703;

Illinois Session Laws 1836, page 145;
Corrigan Trans. Co. v. *Sanitary District*, 137 Fed. 851, 857.

III.

THIS EXERCISE OF SOVEREIGN POWER BY ILLINOIS, IN CONSTRUCTING AND OPERATING A CANAL THAT UNITED THE WATERS OF LAKE MICHIGAN WITH THOSE OF THE ILLINOIS RIVER, AND THAT DIVERTED WATER FROM LAKE MICHIGAN INTO THE MISSISSIPPI VALLEY, HAD THE SANCTION AND APPROVAL OF CONGRESS LONG BEFORE THE ORIGINAL CANAL WAS BUILT.

32 Annals of Congress, 15th Congress, 1st Session, 1677;
Act of March 30, 1822, 3 Stats. at L. 659;
Act of March 2, 1827, 4 Stats. at L. 234.

IV.

NEITHER THE BILLS, NOR THE DECREE, ARE BASED ON ANY CONTENTION OR SHOWING THAT ILLINOIS HAS UNNECESSARILY OR UNREASONABLY OR SUBSTANTIALLY INTERFERED WITH INTERSTATE COMMERCE. ON THE CONTRARY, THEY REST ENTIRELY ON THE THEORY THAT ILLINOIS CANNOT DIVERT ANY WATER FROM LAKE MICHIGAN FOR USE IN THE CANAL, WITHOUT THE FEDERAL CONSENTS PRESCRIBED IN SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899. IT IS THE THEORY OF THE BILLS THAT BOTH THE AFFIRMATIVE CONSENT OF CONGRESS AND THE PERMISSION OF THE SECRETARY OF WAR, AND THE RECOMMENDATION OF THE CHIEF OF ENGINEERS, MUST BE OBTAINED AS CONDITIONS PRECEDENT TO ANY DIVERSION WHATEVER. ON THIS THEORY NEITHER THE BILLS NOR THE DECREE CAN STAND, FOR THE REASONS TO BE STATED IN THE FOLLOWING POINTS.

U. S. v. *Rio Grande Dam Co.*, 174 U. S. 690, 703;
Escanaba Transit Co. v. *Chicago*, 107 U. S. 678, 683;
Cummings v. *Chicago*, 188 U. S. 410, 430.

V.

SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, WAS NOT INTENDED TO BE RETROACTIVE IN EFFECT. IT DOES NOT APPLY TO THIS ALREADY EXISTING DIVERSION WHICH HAD BEEN VALIDLY AUTHORIZED BY ILLINOIS. IT LOOKS TO THE FUTURE NOT TO THE PAST.

U. S. v. *Bellingham Bay Boom Co.*, 176 U. S. 211, 214;

U. S. v. *Rio Grande Dam Co.*, 174 U. S. 690, 703.

VI.

CONGRESS DID NOT INTEND BY SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, TO DECLARE THAT THIS PARTICULAR DIVERSION IS IN FACT, EITHER AN OBSTRUCTION TO NAVIGABILITY OR AN UNREASONABLE OR UNNECESSARY OR SUBSTANTIAL OBSTRUCTION. NOR DID CONGRESS INTEND, BY SUCH ACT, TO TAKE SUCH GENERAL OR EXCLUSIVE POSSESSION OF THE SUBJECT OF OBSTRUCTIONS TO NAVIGABILITY, AS TO RENDER UNLAWFUL ALL OBSTRUCTIONS NOT SPECIFICALLY AUTHORIZED BY FEDERAL CONSENTS, AS PRESCRIBED IN THE ACT.

Cummings v. *Chicago*, 188 U. S. 410, 430.

VII.

THE FACT THAT CONGRESS BY THE "NIAGARA FALLS ACT" OF 1906, EXPRESSLY GAVE TO THE SECRETARY OF WAR AUTHORITY TO CONSENT TO DIVERSIONS OF WATER FROM THE NIAGARA RIVER, SHOWS CLEARLY THAT CONGRESS HAD NOT THERETOFORE INTENDED TO COVER THE SAME FIELD BY SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, WHEREBY IT WAS DECLARED UNLAWFUL "TO ALTER * * * THE * * * CAPACITY OF ANY * * * CANAL, LAKE * * * OR OF THE CHANNEL OF ANY NAVIGABLE WATER OF THE UNITED STATES, UNLESS THE WORK HAS BEEN RECOMMENDED BY THE CHIEF OF ENGINEERS AND AUTHORIZED BY THE SECRETARY OF WAR PRIOR TO BEGINNING THE SAME."

Act of June 29, 1906, 34 Stats. at L. 626;
59th Congress, 1st Session, Report #4694;
Congressional Record June 2, 1906.

VIII.

TO SUSTAIN THE DECREE, IT IS NECESSARY TO CONSTRUE SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, AS A GRANT TO THE SECRETARY OF WAR OF UNLIMITED POWER TO PERMIT OR REFUSE THE CREATION OF OBSTRUCTIONS TO NAVIGATION. THE ACT DOES NOT ADMIT OF SUCH A CONSTRUCTION.

1. The power, conferred by the Act upon the Secretary of War, was intended to be administrative in effect and narrow in scope. It could not have been intended to authorize him to act, in place of Congress, in deciding broad questions of sovereign right or public policy, such as the judicial question whether Illinois had the sovereign power to divert water from Lake Michigan, or the legislative questions whether Illinois should be allowed to divert water, and what quantity, and for what purpose.

2. In attempting by his order of December 5, 1901, to fix and limit the quantity of water that appellant might divert from Lake Michigan, the Secretary of War necessarily assumed that he had power:

(a) To supersede and make inoperative the statute of Illinois theretofore enacted, pursuant to its reserved police power, by which Illinois had authorized appellant to use navigable waters within the state for the health and welfare of its people.

(b) To deny to the Illinois and Mississippi River Valleys the diversion of the quantity of water needed for effective waterway navigation, and to decide that the interests of the Great Lakes were of higher public value than those of the Mississippi Valley.

(c) To substantially reduce the low water flow of these two rivers, and thereby greatly increase the cost to the Government of maintaining a reasonable channel from the Lakes to the Gulf.

(d) To decide the question of public policy involved, in permitting a diversion of 4,167 c. f. s., thereby, to this extent, lowering lake levels and reducing water power at Niagara, and so deciding rights claimed by the citizens of Canada, while at the same time denying the right of appellant to a larger diversion.

IX.

(1) IF CONGRESS HAD INTENDED BY ITS ACTS TO DELEGATE TO THE SECRETARY OF WAR THE POWER TO DECIDE SUCH QUESTIONS, THIS ATTEMPTED DELEGATION WOULD HAVE BEEN UNCONSTITUTIONAL AND VOID, BECAUSE CONGRESS FAILED TO FURNISH ANY GUIDE, PRINCIPLE OR RULE, PURSUANT TO WHICH THE SECRETARY SHALL EXERCISE THE POWER IN QUESTION.

Wichita R. R. Co. v. *Public Utilities Commission,* 260 U. S. 48, 58.

(2) AND EVEN IF SUCH POWER HAD BEEN VALIDLY DELEGATED, THE MANNER OF ITS EXERCISE IN THE CASE AT BAR CANNOT BE SUSTAINED UNDER THE "DUE PROCESS" CLAUSE—BECAUSE MANY INTERESTS DIRECTLY AND ADVERSELY AFFECTED BY THE DECISION OF THE SECRETARY, INCLUDING THESE AMICI CURIAE, WERE GIVEN NO NOTICE OR OPPORTUNITY TO BE HEARD, AND THE ACT REQUIRED NO SUCH NOTICE OR HEARING.

Union Bridge Co. v. *U. S.* 204 U. S. 364, 385;
Monongahela Bridge Co. v. *U. S.* 216 U. S. 177, 192.

X.

ASSUMING FOR ARGUMENT ONLY, THAT SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, AND THE AUTHORITY OF THE SECRETARY OF WAR THEREUNDER, DID APPLY TO APPELLANT'S DIVERSION, NEVERTHELESS THE REQUIREMENTS OF SAID ACT WERE MET, IN THAT ILLINOIS HAD OBTAINED THE PRIOR "AFFIRMATIVE AUTHORITY OF CONGRESS," AND THE PARTICULAR WORKS WERE "AUTHORIZED BY THE SECRETARY OF WAR" AND "RECOMMENDATION BY THE CHIEF OF ENGINEERS."

(1) The State of Illinois built its Sanitary and Ship Canal, pursuant not only to the sovereign power of the State, but also under the "affirmative authority" of Congress.

Mortell v. *Clark,* 272 Ill. 201, 213.

(2) The particular "works" which resulted in this diversion by appellant were also "authorized by the Secretary of War," and "recommended by the Chief of Engineers."

XI.

THE CONTENTIONS MADE IN THE BRIEF FILED ON BEHALF OF THE LAKE STATES, APPEARING AS AMICI CURIÆ, ARE EITHER OUTSIDE THE ISSUES OF THIS CASE, OR WITHOUT MERIT.

Illinois Central R. R. v. *Illinois*, 146 U. S. 387, 435;
U. S. v. *Rio Grande Dam Co.*, 174 U. S. 697;
Kansas v. *Colorado*, 206 U. S. 46;
Guttierres v. *Albuquerque L. & I. Co.*, 188 U. S. 545, 553, 554;
Boquillas L. & I. Co. v. *Curtis*, 213 U. S. 339, 344, 345;
Leovy v. *U. S.*, 177 U. S. 621, 636;
Missouri v. *Illinois*, 200 U. S. 496, 526.

XII.

WITHOUT REGARD TO QUESTIONS OF LEGAL POWER, THE RELATIVE EQUITIES IN THE INSTANT CASE REQUIRE A REVERSAL OF THE DECREE.

BRIEF OF THE ARGUMENT.

I.

INTRODUCTORY: THE QUESTION OF SOVEREIGN POWER AS BETWEEN THE UNITED STATES AND THE STATE OF ILLINOIS.

We understand, and shall assume in this brief, that the courtesy extended by the Court to these *amici curiae* permits them merely to make such suggestions as they think may aid the Court in its consideration of the issues presented by the record. Therefore, in presenting the contentions herein submitted on behalf of these *amici curiae*, and also in endeavoring to answer the contentions made in the briefs for the Lake States and for the Lake Carriers Association, we shall endeavor to confine this brief to the points that we think are thus in issue.

In the case at bar, two sovereigns, Illinois and the United States, have each attempted to exercise sovereign power concerning certain navigable waters of the United States located within the State of Illinois. Each sovereign claims that its own action was valid and effective, and that the other's action was, in certain respects, illegal and ineffective. So, before a conclusion can be reached, it is necessary, first, to have clearly in mind the exact subject matter involved, and the nature and extent of the power of each sovereign over this subject matter.

The subject matter consists of the navigable waterway between Lake Michigan and the mouth of the Illinois River, **all of which** (including a part of Lake Michigan) **lies within the State of Illinois**, and part of which (the southwest part of the Lake) is the **property** of Illinois.

By work done wholly within its own borders, *i. e.*, by deepening and widening the Chicago River, and by building and

operating a canal to be used for navigation and sanitation, Illinois has reversed the flow of the Chicago River, and with water thereby extracted by gravity flow from Lake Michigan, has greatly improved the navigability of this waterway, has purified Chicago's water supply, has abated the unsanitary condition of the Chicago and Illinois Rivers, and has disposed of Chicago sewage by diluting it and causing it to flow away from the Lake and down this waterway, instead of into the Lake. Illinois claims that all of these acts were within its sovereign powers.

But the Government claims that this diversion of water has to some extent lowered the level of the Lakes, has thereby caused "an obstruction" to their "navigable capacity," and is unlawful solely because Illinois did not obtain the several Federal consents required by Section 10, of the Rivers and Harbors Act of 1899.

The State of Illinois has all the powers of a sovereign except those expressly granted to the National Government by the Constitution of the United States. There exists no superior law which controls Illinois in the exercise of its reserved sovereign powers, unless it be found in the language of the Constitution, or in a law of the United States, properly founded upon the Constitution.

Missouri v. *Illinois*, 200 U. S. 518, at .....

Even though an exercise of State sovereignty may result in remediable injury to another state or its citizens, there exists no superior law which because of such injury renders unlawful such exercise of sovereignty. The Constitution provides a remedy for such situations, but in no sense contains any prohibition against such acts. The injured state may, by original suit before the Supreme Court redress such injuries, and in a proper case the Supreme Court may assert the power of the nation to prevent such acts, and of course declare them unlawful, but in advance of such a decision by the

Supreme Court, there exists no power to declare such acts unlawful, nor is there any law applicable thereto. Up to the present, no decision of this Court in a proper case, has declared the acts of Illinois here in question, to be unlawful.

To protect the health of its people by providing proper supplies of drinking water and adequate sanitary disposals of sewage is peculiarly within the sovereign powers of Illinois; (*Columbus* v. *Mercantile Trust Co.*, 218 U. S. 645, at 648).

In respect of local subjects that concern its public policy, a state **may** (as shown by cases cited herein), **exercise its sovereign powers** over **navigable waters within its borders.**

While the power to construct **a canal** within a state, as in the case at bar, is cited by this court as an instance in the class of cases in which the power of the state is exclusive of Congressional control under the Commerce Clause, (*Covington Bridge Co.* v. *Kentucky*, 154 U. S. 204, at 209), the power **to improve navigable channels within a state**, as in the case at bar, is within the class of cases described by this court in the same case (page 211) as of "**concurrent jurisdiction,**" *i. e.*, the failure of Congress to take complete legislative control of the subject **leaves the states free to act**; (*Montgomery* v. *Portland*, 190 U. S. 89, at 105); and when the state's sovereign powers are exercised in reference to matters more or less connected with interstate commerce, such powers are not restricted to mere regulations pertaining to the health, morals or physical well being of the public, but may also include actions designed to promote the public convenience or prosperity, like bridging navigable rivers within the state, etc.; (*Lake Shore R. R. Co.* v. *Ohio*, 173 U. S. 285, at 292).

When Congress, by failing to take complete legislative control of the subject, leaves the states free to act in respect of subjects of "concurrent jurisdiction," a state may act, even though it thereby causes incidental obstruction to navigability.

In the exercise of such power **a State may permit the appropriation and diversion of water from a navigable stream,** subject, however, as in the case of other concurrent powers, to a proper exercise of the jurisdiction of Congress to preserve navigability.

In *U. S.* v. *Rio Grande Dam Co.*, 174 U. S. 690, at 702-703, there was a diversion of water from the Rio Grande River (flowing between the United States and Mexico), and a claim by the United States, that such diversion of water from the Rio Grande River should be abated as a substantial obstruction to navigability.

Concerning the power of a state to change the common law rule against the appropriation of the waters of a river, this court said, at page 702-3, (heavy face type ours):

> "* * *, it is also true that as to every stream within its dominion **a state may change this common law rule** and **permit the appropriation of the flowing waters for such purposes as it deems wise** * * *.
>
> Although this power of changing the common law rule as to streams within its dominion undoubtedly belongs to each state, yet two limitations must be recognized: * * * That **it (the state) is limited by the superior power of** the general government **to secure the uninterrupted navigability** of all navigable streams within the limits of the United States. In other words, the jurisdiction of the general government over interstate commerce and its natural highways vests in that government the right to take all needed measures **to preserve the navigability** of the navigable water courses of the country even against any state action. **It is true there have been frequent decisions recognizing the power of the state, in the absence of congressional legislation, to assume control of even navigable waters within its limits to the extent of creating dams,** booms, bridges **and other matters which operate as obstructions to navigability. The power of the state to thus legislate for the interests of its own citizens is conceded,** and **until** in some way **Congress asserts its superior power,** and the necessity of preserving the general interest of the people of all the states, **it is assumed that state action, although in-**

volving temporarily an obstruction to the free navigability of a stream, is not subject to challenge. A long list of cases to this effect can be found in the reports of this court. See among others, the following: *Wilson* v. *Black Bird Creek Marsh Co.* 2 Pet. 245; *Gilman* v. *Philadelphia,* 3 Wall. 713; *Escanaba Co.* v. *Chicago,* 107 U. S. 678; *Willamette Iron Bridge Co.* v. *Hatch,* 125 U. S. 1."

All this proceeds upon the theory that non-action by Congress implies its assent to the action taken by the state.

For other cases in which there were diversions or appropriations of water and in which the power of the states was recognized, see: *Guttierres* v. *Albuquerque Land & Irr. Co.* 188 U. S. 545, at 553-554; *Boquillas Land and Irr. Co.* v. *Curtis,* 213 U. S. 339, at 344-345.

The power of the United States, is limited to the constitutional grant of power to **"regulate"** through the action of Congress, interstate and foreign commerce, which includes power to protect the navigability of the navigable waters of the United States: (*Willamette Iron Bridge Co.* v. *Hatch,* 125 U. S. 1, at 8; *U. S.* v. *Rio Grande Dam Co.* 174 U. S. 690, at 703.)

But this grant of power does not *per se* exclude all exercise by the states of their sovereign power over navigable waters within their own borders.

The power of Congress **must be exercised,** in order to become effective as a restraint upon state action. And its exercise does not necessarily or in all cases exclude or invalidate state action.

This Court has, in a number of cases, treated the powers of a state to improve navigable waters within its borders as pertaining to the "concurrent jurisdiction," *i. e.,* to the class of cases in which a failure by Congress to take complete legislative control of the subject leaves the states free to act upon such portion of said subject as Congress has not

completely occupied; *Montgomery* v. *Portland,* 190 U. S. 89, at 105; *Escanaba Transp. Co.* v. *Chicago,* 107 U. S. 678, at 683.

In the last named case this court held—in respect of bridges built by the City of Chicago across the Chicago River, (a part of the same navigable water involved in the case at bar), which bridges were complained of as obstructions to the navigability of the river,—that such local subjects are of the "concurrent jurisdiction" class, *i. e.,* **within the power** of the state (page 683), **"until Congress interferes and supersedes it."** And speaking of the state's exercise of such power, and the superior control of Congress over the same, the Court said, at page 683 (heavy type ours):

> "When its power is exercised **so as to unnecessarily obstruct** the navigation of the river or its branches, Congress may interfere and remove the obstruction. * * *
>
> But **until Congress acts** on the subject the **power of the state over bridges across its navigable streams is plenary."**

But in order thus to interfere, Congress must in fact exercise its constitutional power to regulate commerce, and it can do this **only by legislation** which **clearly evidences its intent to interfere with what the state has theretofore done** in the exercise of the latter's sovereign power.

As this Court said in *Cummings* v. *Chicago,* 188 U. S. 410, at 430, in construing Section 10, of the Rivers and Harbors Act of March 3, 1899, and in deciding that by said Section 10, Congress did not assume even such exclusive jurisdiction as to override the necessity of complying with the requirements of a mere ordinance of the City of Chicago, which called for the prior approval of a city officer:

> "If it had intended by the Act of 1899 * * * **to supersede entirely,** the authority which the states, in the absence of action by Congress, have in such matters, such a radical departure from the previous policy of the Government **would have been manifested by clear and**

explicit language. In the absence of such language, it should not be assumed that any such departure was intended."

Therefore, unless it be held that Section 10, of the Act of 1899, does contain a clearly expressed intent of Congress to interfere with and abate this diversion of water from Lake Michigan, which Illinois had theretofore validly authorized, and to which Congress itself had theretofore expressly given its approval by the Act of March 2, 1827, **the authority and action of the State must stand.**

II.

BEFORE CONGRESS HAD ACTED AT ALL ON THE SUBJECT OF OBSTRUCTING NAVIGABILITY, ILLINOIS WAS FREE TO AND DID EXERCISE ITS SOVEREIGN POWER OVER THESE NAVIGABLE WATERS WITHIN ITS OWN BORDERS, BY BUILDING A CANAL TO "UNITE THE WATERS OF LAKE MICHIGAN WITH THOSE OF THE ILLINOIS RIVER," AND IN THE OPERATION OF THIS CANAL, FOR THE DUAL PURPOSES OF NAVIGATION AND SANITATION, ILLINOIS SINCE 1848 HAS CONTINUOUSLY AND LAWFULLY DIVERTED WATER FROM LAKE MICHIGAN.

Each of these purposes, as shown by above cases, was within the sovereign powers of Illinois. Independently of any consent by Congress, it had the power to authorize the construction of a navigable canal, within its borders. (*Covington Bridge Co.* v. *Kentucky,* 154 U. S. 204 at 209.) And that this power was exercised for the purpose of preserving the health of its people,—a matter over which Congress had no jurisdiction—certainly did not weaken the legal effectiveness of the state's exercise of its sovereign power.

Moreover, as held in *U. S.* v. *Rio Grande Dam Co.,* 174 U. S. 690 at 703 (see above), the State also had concurrent power to change the common law rule in reference to flowing waters, and to authorize a diversion of water from Lake Michigan, for use in the canal, and (Congress not having

acted adversely) the State had this power even without the consent of Congress.

The State of Illinois, by its General Assembly, passed an Act, January 9, 1836, (Illinois Sessions Laws, 1836, p. 145; Appts. Narr. St. pp. 412, 413), under which the "Illinois and Michigan" canal was constructed.

By this Act the width of the canal was fixed and additional space for its future enlargement was provided. The depth was to be suitable for ordinary "canal navigation."

That a diversion of water from Lake Michigan through said canal was contemplated, is shown by the provision in Section 16, of said statute, that the canal was **"to be supplied with water from Lake Michigan** and such other sources as the canal commissioners may think proper."

Work on this canal was started by Illinois on July 4, 1836, and the canal was put in operation in 1848. Because adequate funds were lacking to construct a "deep cut" canal through the Divide, the original canal was constructed on the "shallow cut plan" with a summit level eight feet above Lake Michigan (Appts. Narr. St. 416.) But water was supplied by pumps from the Chicago River at Bridgeport (where the canal and river met) and thus from Lake Michigan. To the extent that the canal was fed from the Calumet and Chicago rivers, both of which emptied into Lake Michigan, **there was a diversion.**

Such diversion continued until 1871, when the "Deep Cut Plan" had been adopted and carried out (Appts. Narr. St. p. 419) for the dual purposes of providing greater depth in the canal, and of relieving unsanitary conditions in the Chicago River. Water from Lake Michigan was thereafter supplied to the canal by gravity flow, (Appts. Narr. St. 420-421). And because later this flow was reduced by a natural lowering of the level of Lake Michigan the flow was, in 1883, materially

increased by pumping. (Appts. Narr., Cooley's testimony, p. 272.) This increased diversion continued until Appellant's "Sanitary and Ship Canal" was constructed and opened in place of the Illinois and Michigan canal, for the dual purposes of navigation and sanitation, pursuant to Act of the General Assembly of Illinois, May 29, 1889, (Session Laws of Illinois 1889, p. 126), which created Appellant, authorized the construction and operation of the present canal, and directed a diversion of water from Lake Michigan. (Appts. Narr. St. p. 449.)

All this had been done by Illinois before Congress passed the Act of March 3, 1899, on which these bills rely.

As was said by the Circuit Court of Appeals, 7th C. in *Corrigan Transit Company* v. *The Sanitary District of Chicago*, 137 Fed. 851, at 857:

> "With the commerce clause in abeyance, Illinois, as to every being in the world except future congresses was absolute sovereign in the premises."

III.

THIS EXERCISE OF SOVEREIGN POWER BY ILLINOIS, IN CONSTRUCTING AND OPERATING A CANAL THAT UNITED THE WATERS OF LAKE MICHIGAN WITH THOSE OF THE ILLINOIS RIVER, AND THAT DIVERTED WATER FROM LAKE MICHIGAN INTO THE MISSISSIPPI VALLEY, HAD THE SANCTION AND APPROVAL OF CONGRESS LONG BEFORE THE ORIGINAL CANAL WAS BUILT.

This claim of Illinois, that it had the power, as a sovereign state, to build and operate a canal that would divert waters from Lake Michigan into the Mississippi Valley, has been recognized by Congress ever since Illinois became a state, in 1818.

When Congress, in 1818, fixed the boundaries of Illinois, prior to admitting the state, Congress, by an amendment to

the original act, included within the new state what is now the northern part of Illinois, including the southwestern part of Lake Michigan. The purpose of this inclusion, as then stated in Congress, was to gain a coast on Lake Michigan and thereby to connect Illinois through the lakes with the states of Indiana, Ohio, Pennsylvania, and New York; and it was also stated (32 Annals of Congress, 15th Congress, First Session, p. 1677); that:

> "The facility of opening a canal **between Lake Michigan and the Illinois River is acknowledged** by everyone who has visited the place. **Giving to the proposed state** the Port of Chicago (embraced in the proposed limits), will **draw its attention to the opening of the communication between the Illinois River and that place, and the improvement of that harbor.**" (App. Narr., page 405.)

By thus "**drawing the attention**" of Illinois "**to the opening of the communication between the Illinois River and the Port of Chicago,**" it is clear that Congress expected and practically invited the new state to exercise its sovereign power by opening such a "communication," leaving, of course, to the state, liberty of action under its sovereign power to determine the size and character of the canal, thus suggested as desirable to be opened between the two water sheds.

The well known fact that the water level of the Port of Chicago, opening into Lake Michigan, was much higher than the Gulf of Mexico, necessarily involved and assumed a diversion of water from the Lake into the Illinois River and the Mississippi Valley, when such a "communication" should be "opened." This expectation of Congress, that Illinois would construct and operate a canal to connect Lake Michigan and the Illinois River, was given more definite expression by the Act of Congress of March 30, 1822, (3 U. S. St. at L., page 659; App. Narr. Statement, 410). From this Act we quote:

> "**An Act to Authorize the State of Illinois to Open a**

Canal Through the Public Lands to Connect the Illinois River with Lake Michigan.

SECTION 1. Be it enacted * * * that the State of Illinois be, and is hereby authorized to survey and mark, through the public lands of the United States, the route of the canal connecting the Illinois River with the southern bend of Lake Michigan; * * * and the use thereof forever shall be, and the same is hereby vested in the said state, for a canal, and for no other purpose whatever; * * * provided, also, and it is hereby further enacted and declared, that the said canal when completed shall be and forever remain a public highway, etc. * * *"

Concerning the above language it should be noted:

(a) The title indicates that in 1822, Congress was still expecting Illinois "to open a canal to connect the Illinois River with Lake Michigan," as the "communication" between the Illinois River and the Port of Chicago that Illinois had been invited to open when it was admitted as a state.

The title also clearly recognizes that Illinois had sovereign power to open such a canal, because the authority expressed in the title has relation only to opening a canal through the public lands, for which the consent of Congress was necessary, but is not predicated on the theory that Congress could authorize the opening of a canal through any other lands.

(b) Section 1, of the Act, emphasizes the idea that the authority intended to be granted, had relation to a permit to cross the public lands rather than a permit to build a canal. This appears from the words:

> "Illinois * * * is hereby authorized to survey and mark through the public lands of the United States the route of the canal connecting the Illinois River with the Southern bend of Lake Michigan."

By the words "the canal," Congress evidently had in mind some previously discussed plan for a canal, rather than by this Act to originate a new project.

This Act also contained a provision, that if Illinois did not

make a survey and furnish a complete copy thereof to the Treasury Department within three years, then the grant of land made by the Act, would become void; and the failure of Illinois to comply with this condition, did in fact void the Act.

The project for such a canal, however, did not die. In 1826, the legislature of Illinois petitioned Congress for an additional Act to aid Illinois in the construction of the canal.

In this memorial of Illinois, (App. Narr., page 411), it is stated:

> "That **the construction of a canal, uniting the waters of Lake Michigan with the Illinois River,** will form an important addition to the great connecting links in the chain of internal navigation, etc."

In 1827, Congress granted this petition of Illinois, by the Act of March 2, 1827, (4 U. S. Stat. at L. page 234), entitled and providing:

An Act To Grant a quantity of land to the State of Illinois, for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan.

> "Section 1. Be it enacted * * * that there be and hereby is granted to the State of Illinois, for the purpose of aiding the said State in opening a canal to unite the waters of the Illinois River with those of Lake Michigan, a quantity of land equal to one-half of five sections in width on each side of said canal * * *; provided, THAT the said canal when completed shall be and forever remain a public highway for the use of the Government of the United States free from any toll or other charge whatever for any property of the United States or persons in their service passing through the same; * * *
>
> (2) And be it further enacted, That, so soon as the route of said canal shall be located and agreed on by the said State, it shall be the duty of the Governor thereof, or such other person or persons as may have been, or shall hereafter be, authorized to superintend the construction of said canal, to examine and ascertain the particular sections to which said State will be entitled

under the provisions of this Act, and report the same to the Secretary of the Treasury of the United States."

(a) Here again, the attitude and action of Congress show, that in 1827, it was still expecting Illinois to open the water communication between the Illinois River and the Port of Chicago, to which, as above stated, reference had been made in Congress as one of the purposes of including a part of Lake Michigan within said state.

The language of the Act, constitutes an express recognition by Congress, that Illinois had sovereign power to build a canal to connect the waters of the Illinois River with those of Lake Michigan, because the grant made by Congress was not of permission **to construct** such a canal but was of land, and was expressly made, for the purpose "of aiding" Illinois, in the exercise by the latter of its sovereign power to open such a canal.

(c) A canal that would, as stated in Section 1, of the Act, unite the waters of the Illinois River with those of Lake Michigan, necessarily meant a diversion from the St. Lawrence water shed to the Mississippi Valley, of whatever quantity of water Illinois might in its sole discretion decide to thus divert; and this quantity was necessarily subject to such additions from time to time as Illinois might deem necessary, for the purpose of meeting the changing conditions of its advancing civilization.

(d) While this grant was of land, and was not expressed to be a grant of Congressional permission or authority to build a canal, (thus evidencing the Congressional concept that Illinois, under its sovereign power, could build such a canal without the prior authority of Congress), it is nevertheless, **by necessary implication,** a clear expression by Congress of its consent and approval to the construction by Illinois of a canal that would unite the waters of the Illinois River with those of Lake Michigan.

We therefore respectfully submit, that it is clear from the attitude and actions of Congress, above set out: That Congress understood and assumed, that the exercise of sovereign power by Illinois, in constructing and operating such a canal **did not require the prior consent of Congress**; and that the historic project for the union of said navigable waters had not only the sanction and approval of Congress before the original canal was built, but it also had the affirmative aid of Congress to the extent that Congress deemed its aid necessary to authorize the resulting diversion of Lake waters, by a grant of lands which could be sold by Illinois and the proceeds used in the construction of the canal.

IV.

NEITHER THE BILLS, NOR THE DECREE, ARE BASED ON ANY CONTENTION OR SHOWING THAT ILLINOIS HAS UNNECESSARILY OR UNREASONABLY OR SUBSTANTIALLY INTERFERED WITH INTERSTATE COMMERCE. ON THE CONTRARY, THEY REST ENTIRELY ON THE THEORY THAT ILLINOIS CANNOT DIVERT ANY WATER FROM LAKE MICHIGAN FOR USE IN THE CANAL, WITHOUT THE FEDERAL CONSENTS PRESCRIBED IN SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899. IT IS THE THEORY OF THE BILLS THAT BOTH THE AFFIRMATIVE CONSENT OF CONGRESS AND THE PERMISSION OF THE SECRETARY OF WAR, AND THE RECOMMENDATION OF THE CHIEF OF ENGINEERS, MUST BE OBTAINED AS CONDITIONS PRECEDENT TO ANY DIVERSION WHATEVER. ON THIS THEORY NEITHER THE BILLS NOR DECREE CAN STAND, FOR THE REASONS TO BE STATED IN THE FOLLOWING POINTS.

The State of Illinois having validly authorized the diversion of water from Lake Michigan pursuant to the State's plenary though "concurrent jurisdiction," it follows that thereafter Congress could take action to prevent such diversion only **if the diversion constituted an unreasonable or substantial interference with interstate commerce, by materially obstructing navigability.**

We respectfully submit that this conclusion necessarily follows from the fact that the sovereign power, when thus exercised by Illinois, was validly exercised, and therefore the State's permission to divert water from the Lake was a valid permission, even though such action "caused incidental obstruction to navigability," (*U. S.* v. *Rio Grande Dam Co.*, 174 U. S. 690 at 703).

As this Court said in *Escanaba Transp. Co.* v. *Chicago*, 107 U. S. 678 at 683, referring to the State's exercise of its said power by building bridges across the navigable Chicago River:

> "When its power is exercised **so as to unnecessarily obstruct** the navigation of the river or its branches, **Congress may interfere and remove the obstruction.**"

But Congress **must act** in order to thus "interfere" with the State's action. And it cannot be possible that Congress may interfere with and abate what the State has validly done, unless the State has in fact caused an unreasonable or substantial obstruction to navigability.

If a state has in fact caused an unreasonable or substantial obstruction to navigalibity, which Congress thereafter seeks under its dominant power, to abate, Congress may do so only by a statute appropriate to effectuate such purpose. Such a statute must, in clear and explicit language, express the intent of Congress to interfere with what the State has already done. This, it may do either by expressly referring to the particular obstruction intended to be abated, or by defining some general class of obstructions intended to be abated, within which class the particularly obstruction will fall. And no pre-existing obstruction will be presumed to come under condemnation by Congress, unless the intent of Congress to abate it has been clearly and explicitly expressed in one or the other of the above methods.

No Act of Congress directed toward the abatement of ob-

structions to be created in the future, will be construed to also condemn existing obstructions that had theretofore been validly authorized by a State, unless this retroactive intent is also expressed in clear and explicit language.

Under this established doctrine, we respectfully submit that the decree below is erroneous and should be reversed with dismissal of the bills, because:

(a) The fact does not seem open to dispute, that Illinois had exercised its sovereign power, and had validly authorized a diversion of water from Lake Michigan, and such diversion had commenced—all with the express sanction of Congress—long before Congress enacted any general law purporting to deal with obstructions to navigability.

(b) An examination of Sec. 10 of the Act of 1899, discloses that:

First: This Section is prospective in effect. It was not intended to apply to existing structures. A comparison with Sec. 18 of this Act, which is clearly intended to apply to such existing structures as come within its terms, demonstrates the correctness of this conclusion as to Section 10.

Second: No distinction is drawn in Sec. 10, between obstructions to navigability authorized and created by due exercise of State sovereignty, and structures otherwise originated.

Third: The Section does not evidence or declare such an exclusive taking over of its subject matter by Congress as to supersede all State authority. This Court has so construed it in *Cummings* v. *Chicago,* 188 U. S. at p. 430.

Fourth: The conclusion is inevitable, in view of the above quoted declarations of this Court concerning the method in which Congress must act in order to effectively assert its superior power over obstructions to navigability theretofore validly authorized by a State, that no intent to interfere with or abate this diversion can be found in Section 10, because

such intent must be "manifested by clear and explicit language," and Section 10 contains no language that clearly or explicitly shows such intent.

Fifth: The language of this Section clearly shows it was not an attempt by Congress to enunciate the rule of the Escanaba Case, *supra*, that is, to *generally* forbid unnecessary, unreasonable or material obstructions to navigation authorized by the States. And the Government in this case has not so interpreted the statute, because,

(c) There is no allegation in the bills, that the State of Illinois has unreasonably, unnecessarily, or substantially obstructed navigation by this diversion. There is not a single allegation designed to define or describe the extent or character of the claimed obstruction to navigation.

On the contrary, the case made by the bills, is that all of Appellant's acts are unlawful to the extent that they were not previously authorized by the several Federal consents required (according to the theory of the bills) in every case of any obstruction to navigation, however, authorized, or however slight.

V.

SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, WAS NOT INTENDED TO BE RETROACTIVE IN EFFECT. IT DOES NOT APPLY TO THIS ALREADY EXISTING DIVERSION WHICH HAD BEEN VALIDLY AUTHORIZED BY ILLINOIS. IT LOOKS TO THE FUTURE NOT TO THE PAST.

(1) The language of Section 10 itself is prospective, not retrospective. Thus,

> "Section 10. **That the creation of any obstruction** not affirmatively authorized by Congress to the navigable capacity of any of the waters of the United States **is hereby prohibited;** * * * and **it shall not be lawful** * * * in any manner **to alter or modify** * * * **the capacity** of any * * * canal, lake, etc.; or of the channel of any

navigable water of the United States unless the work **has been recommended** by the Chief of Engineers and **authorized** by the Secretary of War **prior to beginning** the same."

This contention finds added support in the fact that Section 18, of this same Act, does expressly evidence the intent to apply the provisions of Section 18, to already existing bridges, as well as to those thereafter to be constructed. Thus, the opening portion of the Section reads:

> "SEC. 18. That whenever the Secretary of War shall have good reason to believe that any railroad or other bridge **now constructed**, or which **may hereafter be constructed** over any of the navigable waterways of the United States is an unreasonable obstruction to the free navigation of such waters, etc. * * *, it shall be the duty, etc."

In other words, it is evident by a comparison of this above quoted language of Section 18, with the above quoted language of Section 10, that Congress had in mind distinguishing between obstructions to navigability that already existed and those still to be created, in expressing its intent concerning each of said classes of obstructions; and that as to bridges, both those already in existence and those still to be constructed, Congress expressed its intent to make Section 18 retroactive, by the use of "clear and explicit language" to evidence said intent. On the other hand, in Section 10, having no intent to make said Section retroactive, Congress omitted all such language, and on the contrary employed language that distinctly looks to the future, not to the past,—that is distinctly prospective, not retrospective in effect.

(2) In *U. S.* v. *Bellingham Bay Boom Co.*, 176 U. S. 211, this Court construed Section 10 of the Rivers and Harbors Act of 1890 as not retroactive.

The first sentence of Section 10 of said Act of 1890 reads:

> "That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any wa-

ters in respect of which the United States has jurisdiction, is hereby prohibited. * * *"

Concerning this Section the Court said (176 U. S. 211 at 214):

> "It is evident that the first sentence of the 10th Section of the Federal Act refers to an obstruction created **after the passage of the Act.**"

And in *U. S.* v. *Rio Grande Dam Co.*, 174 U. S. 690, speaking of the same Section 10 of the Act of 1890, the Court said, page 708:

> "Whatever may be said in reference to obstructions existing at the time of the passage of the Act, under the authority of state statutes, it is obvious that Congress meant **thereafter,** no state should interfere with the navigability of a stream without the condition of national assent."

It may safely be said, that if either of said Acts of 1890, or 1899, contained expressions looking to the past, it was the Act of 1890, rather than the Act of 1899. Therefore, the fact that Section 10, of the Act of 1890, was held not to be retroactive argues the more strongly for a similar conclusion in respect to Section 10, of the Act of 1899.

VI.

CONGRESS DID NOT INTEND BY SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, TO DECLARE THAT THIS PARTICULAR DIVERSION IS IN FACT, EITHER AN OBSTRUCTION TO NAVIGABILITY OR AN UNREASONABLE OR UNNECESSARY OR SUBSTANTIAL OBSTRUCTION. NOR DID CONGRESS INTEND, BY SAID ACT, TO TAKE SUCH GENERAL OR EXCLUSIVE POSSESSION OF THE SUBJECT OF OBSTRUCTIONS TO NAVIGABILITY, AS TO RENDER UNLAWFUL ALL OBSTRUCTIONS NOT SPECIFICALLY AUTHORIZED BY FEDERAL CONSENTS, AS PRESCRIBED IN THE ACT.

It is only necessary to read Section 10, of the Act of 1899, to show that Congress did not by this Act refer specifically

to this diversion of water at Chicago, or declare it to be either an obstruction to navigability, or an unreasonable or unnecessary or substantial obstruction to navigability. If Congress had intended to interfere with or to abate this already existing Chicago diversion, the cases above cited show that it would have been necessary for Congress to do so by language clearly expressing such intent.

And assuming that it was open to Congress to express such intent, either by specific reference to this particular diversion, or by taking such general or exclusive possession of the subject of obstructions to navigability as would render unlawful, not only this particular obstruction, but all other existing obstructions that had not received the express authorization by Federal authorities as prescribed in the Act,—it is also plain that by Section 10, Congress did not intend to take such general or exclusive possession of this subject as to render this diversion unlawful.

This was clearly the basis of the reasoning of the Court in the decision of *Cummings* v. *Chicago* (188 U. S. 410) as above quoted.

When it is remembered, that by the Act of 1827, as shown above, Congress had expressly recognized the validity of this exercise of the sovereign power of Illinois, and had approved the project for such a canal, it should be still more necessary, to find unmistakable evidence in the words of this general statute expressing such intent, in order to bring within its condemnation this previously approved canal.

We therefor respectfully submit, that the conclusion is inevitable upon the authorities above quoted, that the bills and decree cannot stand because Section 10, of the Act of 1899, on which alone this entire case rests, did not make unlawful this diversion of water at Chicago which had theretofore been validly authorized by the State of Illinois.

VII.

THE FACT THAT CONGRESS BY THE "NIAGARA FALLS ACT" OF 1906, EXPRESSLY GAVE TO THE SECRETARY OF WAR AUTHORITY TO CONSENT TO DIVERSIONS OF WATER FROM THE NIAGARA RIVER, SHOWS CLEARLY THAT CONGRESS HAD NOT THERETOFORE INTENDED TO COVER THE SAME FIELD BY SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, WHEREBY IT WAS DECLARED UNLAWFUL "TO ALTER * * THE * * * CAPACITY OF ANY * * * CANAL, LAKE * * * OR OF THE CHANNEL OF ANY NAVIGABLE WATER OF THE UNITED STATES, UNLESS THE WORK HAS BEEN RECOMMENDED BY THE CHIEF OF ENGINEERS AND AUTHORIZED BY THE SECRETARY OF WAR PRIOR TO BEGINNING THE SAME."

On June 29, 1906 Congress passed the Act for the preservation of Niagara Falls, and for the control and regulation of waters of the Niagara River. (34 Stat. at L. 626.) In the report (59th Cong. 1st Sess. Report No. 4654, Cong. Rec. June 2, 1906) submitted by the Rivers and Harbors Committee of the House accompanying this bill, the Committee states:

> "The Committee regarded the jurisdiction of the United States over Niagara River as unquestionable, because it is a navigable stream in the greater part of its length, and although the waters in some portions are not navigable by reason of falls and rapids, the control of such portions is essential to its adequate maintenance for purposes of navigation. * * * At the beginning of the development of water power at Niagara Falls, no account seems to have been taken of the possible danger to the cataract. The diversion of water was commended as an industrial endeavor of material benefit to the country. While there are, no doubt, many who regret that this diversion was ever commenced, it is impossible to ignore entirely the development which has occurred without injustice to those who have undertaken it. At the same time, it is the opinion of this Committee that these rights should be construed with strictness; that no permit should be issued by the Federal Government for the diversion of water, either for that now in use or which may hereafter be used, except with the right of revocation."

The report also states (heavy face type ours):

"It appears that numerous franchises have been granted by the State of New York for the diversion of water and the creation of power. Of this, however, only two of any considerable importance have been acted upon. * * * The total diversion of water for these two companies which is authorized by the State of New York amounts to 17,200 and 9,500 cubic feet respectively; in all 26,700 cubic feet to be taken from the American side. The total amount at present utilized is about 12,600 cubic feet." * * *

It is a matter of some surprise that the companies which have proceeded to divert the waters of the river under the authority of the State of New York, have never appealed to Congress or to the Federal Government to confirm the authority granted by that state. It is thought best by the Committee that the Federal Authority should now be exerted not merely for the preservation of the scenic grandeur of Niagara Falls, but for the maintenance of navigation and the proper control of the river as a boundary stream."

The first Section of this Act reads as follows:

"That the diversion of water from Niagara River or its tributaries, in the State of New York, is hereby prohibited, except with the consent of the Secretary of War as hereinafter authorized in Section 2 of this Act; but, Provided, That this prohibition shall not be interpreted as forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States under its direction."

As stated above, the bills in this case rest exclusively on the theory that Section 10, of the Act of 1899, forbids any obstruction to navigation not authorized by the Federal consents specified in the Section and that by this diversion at Chicago an obstruction to navigation as defined in Section 10, has occurred. If this were a proper interpretation of the meaning of Section 10, clearly the diversions from the Niag-

ara River, a navigable stream, had already been forbidden by Section 10, of the Act of 1899.

It must be assumed that in passing the Niagara Falls Act, particularly in view of the prohibitions contained in its first section, Congress did not intend to do an idle or unnecessary thing, nor to do over again anything that it considered had been accomplished by its previous legislation,—therefore, we respectfully submit, that by passing the Niagara Falls Act, Congress itself has thereby construed Section 10, of the Act of 1899, **as not forbidding diversions.**

As stated in the report above, until the passage of the Niagara Falls Act, the sole authority for diversions in the Niagara River were the statutes of the State of New York. No Federal supervision of this matter had occurred.

It may be well to point out, concerning the Niagara Falls Act, that the proviso relating to diversions of the waters of the Great Lakes or of the Niagara River, for sanitary or domestic purposes, is prospective in its nature, and does not apply to diversions existing at the time of the enactment. The reasons for this interpretation of the proviso are clearly stated in the brief filed on behalf of the appellant, point IV (c) of argument, page 179-181.

VIII.

TO SUSTAIN THE DECREE, IT IS NECESSARY TO CONSTRUE SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, AS A GRANT TO THE SECRETARY OF WAR OF UNLIMITED POWER TO PERMIT OR REFUSE THE CREATION OF OBSTRUCTIONS TO NAVIGABILITY. THE ACT DOES NOT ADMIT OF SUCH A CONSTRUCTION.

(1) The power conferred by the Act upon the Secretary of War was intended to be administrative in nature and narrow in scope. It could not have been intended to authorize him to act, in place of Congress, in deciding broad questions

of sovereign right or of public policy, such as the judicial question whether Illinois had the sovereign power to divert water from Lake Michigan, or the legislative questions whether Illinois should be allowed to divert water, and what quantity, and for what purposes.

An examination of Section 10, shows at once that Congress in the enactment of this statute did not, as it has done in other matters, for instance the regulation of railroad interstate rates, lay down a broad general principle, and delegate to the Secretary of War authority to determine in particular instances whether facts justified or required the application of the principle.

Section 10, entirely fails to define under what circumstances the Secretary of War shall grant a permit. Congress, of course, cannot be presumed to have delegated to the Secretary of War its own legislative power. To avoid any such interpretation, which would invalidate the section, the power of the Secretary must be strictly construed, and to be of an administrative nature. The propriety of construing his authority as narrow in scope is strengthened by the fact, that under Section 10, the Secretary of War has power to grant the permit specified in the Act, only when the work has been first recommended by the Chief of Engineers.

As disclosed by the record in this case, Secretary of War Taft so construed the statute, when he refused a permit requested by appellant, on the ground that the work in that particular instance, had not been recommended by the Chief of Engineers (Rec., Vol. VIII, 113, 114).

Aside from the first sentence of Section 10, it is submitted that the language there used applies only to construction or engineering works. The Section declares it to be unlawful "to **build**" or "commence the **building**" of certain specified structures. It then declares it to be unlawful "to **excavate**, or **fill**, or in any manner to alter or modify the course, loca-

tion, condition or capacity of" navigable waters, "unless the **work** has been recommended by the **Chief** of **Engineers** and authorized by the Secretary of War prior to **beginning** the same." The words emphasized above refer, we submit, to matters of engineering work, as distinguished from the results of such work or its uses or effects when completed. They serve merely to point out the manner in which proposed *methods* of engineering work, such as excavation, filling, etc., may receive the approval of the Government.

Of course, when Congress passed the Act, it knew that for many years it had been appropriating money and directing its use for harbor, river, and channel improvement, and had been carrying out such improvements through the War Department under the supervision of the Chief of Engineers. Is it not a reasonable interpretation of the Congressional intent to conclude that requiring permits for "works" was insisted upon in order that constructions in the navigable waters of the United States undertaken by persons other than the War Department should be harmonious and not inconsistent, with the plans of harbor development and improvement which the Department was or would at any time be carrying out, pursuant to Congressional requirement? This seems to us a reasonable interpretation of this Section, and if this be its interpretation, clearly the authority of the Secretary and of the Chief of Engineers is, as stated above, administrative in nature and not broad, arbitrary or unlimited.

(2) **In attempting by his order of December 5, 1901, to fix and limit the quantity of water that appellant might divert from Lake Michigan, the Secretary of War necessarily assumed that he had power:**

> **(a) To supersede and make inoperative the Statute of Illinois theretofore enacted pursuant to its reserved police power, by which Illinois had authorized appellant to use navigable waters within the State for the health and welfare of its people.**

We shall now endeavor to show,—by examining the nature and effect of the order of the Secretary of War of December 5, 1901, by which in substance, he decided that Illinois may divert 4,167 cubic feet of water per second, but may not divert any water in excess of said amount fixed by him,—that Section 10 of the Act of 1899 should not be construed as is claimed in these bills, because such construction presupposes the existence of authority in the Secretary of War far different in nature and greater in scope than could have been contemplated by Congress, or even validly delegated to him by Congress.

The authorities heretofore discussed show that the power of Congress to interfere with and abate a previously State-authorized obstruction to navigability, is a legislative power. Therefore, since its exercise must be predicated upon the judgment of Congress itself, either concerning a particular obstruction, that it is substantial and should be interfered with and abated—or concerning a general class of definitely described obstructions within which a particular obstruction might fall—it is obvious that if the Secretary of War were to decide such questions and within his undirected discretion to issue or refuse a permit, he would thereby exercise a legislative power that Congress is incapable of delegating.

We have endeavored to show earlier herein, that the language of Section 10, of the Act of 1899, is not open to the construction that it does either outlaw this particular diversion or lay down any general retroactive rule under which this obstruction would become outlawed. It is obvious that by deciding in his order of December 5, 1901, that appellant should not be permitted to divert from Lake Michigan more than a limited quantity of water fixed by him, the Secretary of War attempted to exercise the power of Congress to interfere with a prior Act of Illinois, valid when enacted and only to be superseded by the exercise of Congressional power to take exclusive possession of the field.

It is manifestly the theory of the bills, that if the Secretary of War had permitted a diversion of 10,000 cubic feet per second, these suits would not have been brought, because under said theory the diversion of 10,000 cubic feet per second would have been lawful. In other words, the Government's charge of illegality rests entirely on the theory that because the Secretary of War has not permitted this diversion it is unlawful, and, therefore, the Government claims that power was delegated to the Secretary of War to grant or permit diversions to any extent whatsoever, if recommended by the Chief of Engineers.

Certainly Congress could not have intended so completely to delegate its own legislative power.

(b) **To deny to the Illinois and Mississippi River Valleys the diversion of the quantity of water needed for effective waterway navigation, and to decide that the interests of the Great Lakes were of higher public value than those of the Mississippi Valley.**

The decision of the Secretary of War not only involved the important question of delegated authority discussed above in subdivision (a), but also required him to decide the broad question of public policy whether, as between the Illinois and Mississippi Valleys on the one hand, and the Great Lakes on the other, any diversion should be permitted and the extent and quantity thereof.

Certainly Congress did not intend to delegate to an executive or administrative officer any such comprehensive power. The broad nature of the power actually exercised by the Secretary of War is shown by the facts in this record. The Government claims a lowering of lake levels of about 5½ inches. Our statement of facts shows that the water diverted by Appellant when turned into the Mississippi River at Grafton serves to increase depths in the Mississippi between Grafton and the mouth of the Ohio about a foot and one-half. The

Court will note that all that Congress is attempting to maintain in this part of the Mississippi River is a navigable depth of six feet. Can it be claimed that Congress intended to delegate to the Secretary of War the power to decide as between the navigation interests of the Mississippi Valley and those of the Great Lakes which should be preferred? This seems to us inconceivable.

(c) **To substantially reduce the low water flow of these two rivers, and thereby greatly increase the cost to the Government of maintaining a reasonable channel from the Lakes to the Gulf.**

The necessary effect of the decision by the Secretary of War that Appellant, instead of diverting 10,000 cubic feet per second, should be compelled to reduce its diversion to less than one-half of said amount, is to substantially diminish the flow of the Illinois and Mississippi Rivers. And this in turn necessarily increases the cost to the Government of the work of dredging and otherwise keeping open and protecting a reasonably usable channel on the Illinois and Mississippi Rivers. It is peculiarly within the province of Congress alone to determine how much money shall be spent for this particular purpose and where it shall be spent. Certainly Congress did not intend by Section 10, of the Act of 1899, to delegate to the Secretary of War any such broad power; and yet this is in effect the Government's claim.

(d) **To decide the question of public policy involved in permitting a diversion of 4,167 cubic second feet, thereby, to this extent, lowering lake levels and reducing water powers at Niagara, and so deciding alleged rights claimed by citizens of Canada, while at the same time denying the right of appellant to a larger diversion.**

The record shows that the contest or conflict between water power interests at Niagara on the one hand, and the interests of Chicago and the Mississippi Valley which need this 10,000

cubic feet of water on the other hand, constitutes an aggressively active dispute. This dispute involves to some extent the claims made by Canadian interests of the right to divert water at Niagara. Also the extent to which Canadian interests may be damaged by this Chicago diversion. If, as the record indicates, a diversion of 10,000 cubic feet per second has caused a lowering of lake levels to the extent of 5½ inches, each other diversion, as well as any contemplated decrease or increase of this diversion, would also have its effect upon lake levels. Therefore, it is clear that if Section 10, of the Act of 1899, be construed to authorize the Secretary of War at his discretion, upon recommendation of the Chief of Engineers, to determine the quantity of diversions that may be made at Chicago, or elsewhere, such decisions would not only involve international relations and claims, but would also delegate to him power to decide questions of broad public policy that Congress alone may validly decide.

IX.

(1) IF CONGRESS HAD INTENDED BY THESE ACTS TO DELEGATE TO THE SECRETARY OF WAR THE POWER TO DECIDE SUCH QUESTIONS, SUCH AN ATTEMPTED DELEGATION WOULD HAVE BEEN UNCONSTITUTIONAL AND VOID, BECAUSE CONGRESS FAILED TO FURNISH ANY GUIDE, PRINCIPLE OR RULE, PURSUANT TO WHICH THE SECRETARY SHALL EXERCISE THE POWER IN QUESTION.

In *Wichita Railroad* v. *Public Utility Commission*, 260 U. S. 48, at page 58, this Court, in dealing with the constitutionality, under a state statute, of an order entered by an administrative body, held the order invalid because not entered in compliance with the general rules laid down in the statute. The Court said, at page 58:

> "This conclusion accords with the construction put upon similar statutes in other states. * * * Moreover, it accords with general principles of constitutional government. The maxim that a legislature may not dele-

gate legislative power has some qualifications, as in the creation of municipalities, and also in the creation of administrative boards to apply to the varying details of rate schedules the regulatory police power of the state. The later qualification is made necessary in order that the legislative power may be effectively exercised. In creating such an administrative agency the legislature, to prevent this being a pure delegation of legislative power, must enjoin upon it a certain course of procedure and certain rules of decision in the performance of its function. * * * It is a wholesome and necessary principle that such an agency must pursue the procedure and rules enjoined and show a substantial compliance therewith, to give validity to its action."

We submit that it is not possible to find any expression in Section 10, of the Act of 1899, which prescribed any procedure the Secretary of War must follow, in granting or refusing the permits therein specified, nor any rules by which he shall be guided in determining whether a particular obstruction shall or shall not be permitted. So far as the language is concerned, the power of the Secretary to grant or refuse a permit is not restricted, confined or guided by any expression whatever to be found in the Section.

The only way in which the power of the Secretary to grant or refuse a permit under this Section can be constitutionally sustained, is to read into the Section by construction the intention of Congress that this power is a narrow one, to be exercised as above suggested merely for the purpose of keeping engineering and other structures in the navigable waters of the United States harmonious and consistent with the work of harbor and channel improvement conducted by the Secretary of War.

It must be assumed that Congress knew of the above "constitutional maxim" concerning the delegation of power by Congress, and that therefore, not having by Section 10 prescribed any course of procedure or rules of decision to control the Secretary of War in granting or issuing permits, it

is clear that Congress did not intend to delegate to the Secretary of War the broad powers claimed by these bills.

(2) AND EVEN IF SUCH POWER HAD BEEN VALIDLY DELEGATED, THE MANNER OF ITS EXERCISE IN THE CASE AT BAR CANNOT BE SUSTAINED UNDER THE "DUE PROCESS" CLAUSE—BECAUSE MANY INTERESTS DIRECTLY AND ADVERSELY AFFECTED BY THE DECISION OF THE SECRETARY, INCLUDING THESE AMICI CURIAE, WERE GIVEN NO NOTICE OR OPPORTUNITY TO BE HEARD, AND THE ACT REQUIRED NO SUCH NOTICE OR HEARING.

That the interests of these *amici curiae* are adversely affected by the Secretary of War's action is, we assume, not open to question.

In the case of *Union Bridge Co.* v. *United States,* 204 U. S. 364, this Court was called upon to construe another Section (18) of the Act of 1899. The following provisions of this Section should be carefully noted:

> "SEC. 18: Whenever the Secretary of War shall have good reason to believe that any railroad or other bridge now constructed or which may hereafter be constructed, over any of the navigable waterways of the United States, is an unreasonable obstruction to the free navigation of such waters, on account of insufficient height, width of span, or otherwise, or where there is difficulty in passing the draw opening or the draw span of such bridge by rafts, steamboats or other water craft, it shall be the duty of the said Secretary, first giving the parties reasonable opportunity to be heard, to give notice to the persons or corporations owning or controlling such bridge, so to alter same as to render navigation through or under it reasonably free, easy and unobstructed; and in giving such notice, he shall specify the changes recommended by the Chief of Engineers that are required to be made, and shall prescribe in each case a reasonable time in which to make them. * * *"

The rights of those whose interests are to be affected by the action of the Secretary of War are here fully protected. Notice must be given. A hearing must be allowed. The

changes required must be specified. A reasonable time within which to make the changes must be permitted. Furthermore, the power of the Secretary can only be exercised when there is an "**unreasonable**" interference with navigation.

Contrast these provisions with the provisions of Section 10.

The opinion in the *Union Bridge Case, supra,* discloses the requirements which Section 10 must meet before it can be held constitutional. The Court said (204 U. S., p. 385):

> "It would seem too clear to admit of serious doubt that the statute under which the Secretary of War proceeded is in entire harmony with the principles announced in former cases. In no substantial, just sense does it confer upon that officer, as a head of an executive department, powers strictly legislative or judicial in their nature, or which must be exclusively exercised by Congress or by the Courts. It has long been the policy of the Government to remove such unreasonable obstructions to the free navigation of the waterways of the United States as were caused by bridges maintained over them. That such an object was of common interest and within the competency of Congress, under its power to regulate commerce, everyone must admit; for commerce comprehends navigation; and therefore to free navigation from unreasonable obstructions is a legitimate exercise of that power. *Gibbons* v. *Ogden,* 9 Wheaton, 1, 189, 190. As appropriate to the object to be accomplished, as a means to an end within the power of the national government, Congress, in execution of a declared policy, committed to the Secretary of War the duty of ascertaining all the facts essential in any inquiry where the particular bridges over the waters of the United States, were unreasonable obstructions to free navigation. Beyond question, if it had so elected, Congress, in some effective mode and without previous investigation through executive officers, could have determined for itself primarily, the fact whether the bridge here in question was an unreasonable obstruction to navigation, and if it was found to be of that character, could by direct legislation have required the defendant to make such alterations of its bridge as were requisite for the protection of navigation and commerce over the waterway in question. * * *

By the statute in question, Congress declared in effect that navigation should be free from unreasonable obstructions arising from bridges of insufficient height and width of span or other defects. It stopped, however, with this declaration of a general rule and imposed upon the Secretary of War the duty of ascertaining what particular cases came within the rule prescribed by Congress, as well as the duty of enforcing the rule in such cases. In performing that duty, the Secretary of War will only execute the clearly expressed will of Congress, and will not, in any true sense exert legislative or judicial power. * * * To this may be added the consideration that Congress, by the Act of 1899, did not invest the Secretary of War with any power in these matters that could reasonably be characterized as arbitrary. He cannot act with reference to any bridge alleged to be an unreasonable obstruction to free navigation without first giving the parties an opportunity to be heard. He cannot require any bridge of that character to be altered even for the purpose of rendering navigation through or under it reasonably free, easy and unobstructed, without giving previous notice to the persons or corporations owning or controlling the bridge specifying the changes recommended by the Chief of Engineers, and allowing a reasonable time in which to make them. * * * In the present case, all the provisions of the statute were complied with. The parties concerned were duly notified and were fully heard. Nor is there any reason to say that the Secretary of War was not entirely justified, if not compelled, by the evidence in finding that the bridge in question was an unreasonable obstruction to commerce and navigation as now conducted.

We are of the opinion that the Act in question is not unconstitutional as conferring upon the Secretary of War powers of such nature that they should not be delegated to him by Congress."

The reasoning thus employed by the Court in construing Section 18, of the Act of 1899, is, in and of itself, sufficient to demonstrate the unconstitutionality of any such delegation of powers as the bills in this case claim.

The *Union Bridge Case, supra,* was followed by the deci-

sion in *Monongahela Bridge* v. *United States*, 216 U. S. 177. Again a question arose under Section 18, of the Act of 1899. The Court was urged to reconsider its ruling in the Union Bridge case, and in the opinion stated the law as follows (p. 192):

> "This Court has heretofore held, upon consideration and after an examination of the adjudged cases:
>
> (1) That 18th Section of the river and harbor Act of March 3, 1899, 30 Statutes 1151, could not reasonably be taken as a delegation of legislative and judicial power to an executive department of the government; that the statute did not in any real, constitutional sense delegate to the Secretary of War any power that must, under our system of government, be exclusively exercised either by the legislative or judicial branch of the government; that under its paramount power to regulate commerce on and over the navigable waters of the United States, Congress could require that such waters be free from unreasonable obstructions to navigation; that the statute in effect prescribed the general rule, applicable to all navigable waters, that free navigation should not be hampered by unreasonable obstructions arising from bridges of insufficient height, width of span, or other defects; that instead of exerting its power by direct legislation in each case of a bridge alleged to constitute an unreasonable obstruction to navigation, Congress charged the Secretary of War with the duty of ascertaining, in each case, upon notice to the parties concerned, whether the particular bridge came within the general rule prescribed;
>
> * * *
>
> (2) That the Act of 1899 did not invest the Secretary of War with arbitrary power in the premises, since in reference to any bridge alleged to constitute an unreasonable obstruction to navigation, he was bound, before making any decision or taking final action, to notify the parties interested of any proposed investigation by him, give them an opportunity to be heard, and allow a reasonable time to make such alterations as he found to be necessary to free navigation."

The Court also said, page 195:

> "It is for Congress, under the Constitution, to regulate the right of navigation by all appropriate means, to

declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined. Its action in the premises cannot be revised or ignored by the Courts or by juries, except that when it provides for an investigation of the facts, upon notice and after a hearing before final action is taken, the Courts can see to it that executive officers conform their action to the mode prescribed by Congress."

We represent here substantial interests that are adversely and materially affected by the decision of the Secretary of War limiting the amount of appellant's diversion. In reaching this decision, there was in fact no hearing of any kind, nor any notice to these *amici curiae*, and they had no opportunity to be heard. So far as they are concerned, there was an entire absence of all those requirements of due process, which alone, under the two above decisions, could render constitutional Section 10.

X.

ASSUMING FOR ARGUMENT ONLY, THAT SECTION 10, OF THE RIVERS AND HARBORS ACT OF 1899, AND THE AUTHORITY OF THE SECRETARY OF WAR THEREUNDER, DO APPLY TO APPELLANT'S DIVERSION, NEVERTHELESS THE REQUIREMENTS OF SAID ACT WERE MET, IN THAT ILLINOIS HAD OBTAINED THE PRIOR "AFFIRMATIVE AUTHORITY OF CONGRESS," AND THE PARTICULAR WORKS WERE "AUTHORIZED BY THE SECRETARY OF WAR" AND "RECOMMENDED BY THE CHIEF OF ENGINEERS."

(1) The State of Illinois built its Sanitary and Ship Canal, pursuant not only to the sovereign power of the state, but also under the "affirmative authority" of Congress.

As we have endeavored to show above (Point III of this brief), the Act of March 2, 1827 (4 U. S. Stat. at L, p. 234), evidenced the expressed purpose of Congress to "aid" Illinois "in opening a canal to unite the waters of the Illinois River with those of Lake Michigan."

While the grant was of *land*, the fact that it was for the expressed purpose of *aiding* Illinois in the opening of such a canal, necessarily implied and carried with it, the affirmative sanction of Congress, to the opening of such a canal; and the grant of this sanction effectively disposes of any contention that under the Commerce Clause, the right to build such a canal was exclusively vested in Congress.

As we have also endeavored to show, under Point III of this brief, it was clearly the view of Congress concerning its powers and those of Illinois respectively, that Illinois had the sovereign power to build such a canal without the consent of Congress, and the land grant made by Congress in aid of this exercise of state sovereignty, constituted not only a recognition by Congress that Illinois had such power, but it also "affirmatively" expressed the sanction and approval of Congress to the carrying out of this project for a canal.

The purpose of Congress in making this grant was undoubtedly in aid of navigation and commerce; and the jurisdiction of Congress attached solely under the Commerce clause. But the sovereign power of Illinois to build and use the Canal for sanitation as well as commerce cannot be denied.

Because of the well known physical facts, that the waters of the Illinois River flow (via the Mississippi) into the Gulf of Mexico, and that the level of the water of Lake Michigan is much higher than that of the Gulf, this grant necessarily included and contemplated the consent of Congress to the diversion of water from Lake Michigan through said canal and into the Mississippi River.

This consent of Congress was given without condition or limitation upon the size of the canal or the quantity of water that might thus be diverted. That the navigable waterway thus contemplated was intended to forever exist, be maintained and operated, as a public waterway, was expressly stated in the Act.

Therefore it does not seem open to question, that so far as the United States is concerned, Illinois had and has the "affirmative authority" of Congress, and the right and power, to forever maintain and operate a navigable ship canal "uniting the waters of the Illinois River with those of Lake Michigan"; that this canal may be of capacity and size reasonably adequate to care for the needs of navigation and commerce as they may develop; and that the quantity of water that may be diverted from Lake Michigan for this purpose, may be increased from time to time to meet the reasonable needs of Illinois for its public purposes;—all without the need of further or additional consent of the United States.

The record shows that pursuant to this Act, and also under its own sovereign power as hereinabove stated, Illinois in 1836 passed a statute under which the "Illinois and Michigan Canal" was constructed and operated.

We have already shown that when this Illinois and Michigan Canal was improved by a deep cut across the Divide in 1871, water flowed by gravity from Lake Michigan through the Chicago River into the canal, and has continued to do so ever since, thus uniting the waters of the Illinois River with those of Lake Michigan.

We have also shown that Appellant's present Sanitary and Ship canal took the place of this earlier canal.

The Supreme Court of Illinois, in *Mortell* v. *Clark*, 272 Ill. 201 at 213,—referring to Appellant's present canal, said:

> "**The canal was built under the authority of the Act of Congress of March 2, 1827,** the Act of 1822 having been mutually abandoned by the state and Federal Government. * * * This Federal Act did not provide just where the canal should enter Lake Michigan, simply stating that the land was granted for the purpose of opening 'a canal to unite the waters of the Illinois River with those of Lake Michigan,' etc. **The Sanitary District's main channel as now constructed complies with this Act and furnishes a canal more suitable for navigation than**

the Illinois and Michigan Canal. Furthermore, the Sag channel or cut off is required to be navigable by the said Act of 1903, and the proof shows that the Calumet River is navigable to the point where it is intersected by the sag channel. This cut off would, therefore, also **practically comply** with both of said Federal Acts as to furnishing part of the canal for connection of the Illinois River with Lake Michigan."

This decision by the Supreme Court of Illinois, is conclusive upon the fact that Appellant's present canal was constructed pursuant to a grant expressed in the Act of March 2, 1827; that it was intended to take the place under said Act, of the Illinois and Michigan canal; and that it is in fact and law a substitute under said Act for the Illinois and Michigan canal, as the canal "to unite the waters of the Illinois River with those of Lake Michigan."

We shall not attempt in this brief, to state or discuss the numerous facts appearing of record and discussed in the brief of Appellant, showing the attitude of the United States toward the Illinois and Michigan canal, during its construction and long service or toward the construction, opening and use of Appellant's present Sanitary and Ship canal, up to the time when the Secretary of War attempted in 1901 to limit the amount of diversion from Lake Michigan.

We deem it sufficient for the purpose of this brief, to respectfully submit on this feature of the case, that said Act of Congress of 1827, constitutes the legally effective "affirmative authority" of Congress, for any reasonable method that Illinois might adopt, for the purpose of uniting the waters of the Illinois River with those of Lake Michigan,—and for periodically increasing the capacity of its canal, and the consequent diversion of water in order to keep the canal reasonably adequate to meet the growing needs of the communities served by it. As to the propriety of the method used by Illinois in carrying out this power,—and the improved health of its people due to these acts is fully described in this

record,—it is sufficient to say that this case on the record, presents only a question as to what power exists but no question as to the reasonableness of its exercise.

Neither of these bills seeks to attack Appellant's diversion on the ground that Illinois has abused or made unreasonable use of, the affirmative authority of Congress thus granted to Illinois by the Act of 1827.

(2) **The particular "works" which resulted in this diversion by appellant were also "authorized by the Secretary of War," and "recommended by the Chief of Engineers."**

The permit of May 8, 1899, in its granting power, states:

> "The Chief of Engineers having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said Sanitary District of Chicago to open the channel constructed and cause the water of Chicago River to flow into the same, subject to the following conditions:"
> (the substance of which was):
> (1) That it is the intention of the Secretary of War to submit the questions connected with this work to Congress, for consideration, the permit to be subject to such action as may be taken by Congress.
> (2) The Secretary of War reserved the right to close or modify it in order to prevent a current unreasonably obstructive to navigation, in the Chicago River.
> (3) The Sanitary District to assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in the Chicago River.

The opening of Appellant's canal, the reversal of the current of the Chicago River, and the consequent diversion of water from Lake Michigan were therefore authorized by the Secretary of War. So far as this case is concerned, there are no conditions upon this permit, because: Many secretaries of war have submitted the matter of this diversion to Congress, but no action has been taken by it; and there is no contention now that a current exists in the Chicago River unreasonably obstructive to navigation.

The Government, as well as Appellant, and the City of Chicago, spent large amounts of money in widening and deepening the channel of the Chicago River, and as the result of such work, 10,000 cubic feet of water per second may be diverted from Lake Michigan through the River and canal, without introducing an unreasonable current into the Chicago River.

We shall not present in detail, the several permits issued by the Secretary of War from time to time to the City of Chicago, or to the Sanitary District, permitting the various steps in the work above referred to, which resulted in the widening and deepening of the Chicago River. These are fully described in Appellant's brief.

We respectfully submit, however, that a consideration of these permits, particularly of the fundamental permit of May 8, 1899, above quoted, conclusively shows that each item of engineering work and construction, directly or indirectly causing a diversion from Lake Michigan of 10,000 cubic feet per second, has been specifically recommended by the Chief of Engineers and permitted by the Secretary of War.

Only after all of these permits had been issued, did the Secretary of War in 1901, by what purports to be a permit, attempt to regulate or limit the amount of water which flowed by gravity from Lake Michigan, as a necessary result of the engineering works theretofore authorized. When the work contemplated in 1901, had been completed, there was no longer any reason for a regulation of the amount of the diversion as affecting the current in the Chicago River. Moreover, the permit of 1901, was not in legal effect, a permit, but was an attempt to regulate the conduct of Appellant's works, and to qualify the unqualified permit that had previously been granted. No such power was given by Sec. 10.

XI.

THE CONTENTIONS MADE IN THE BRIEFS ON BEHALF OF THE LAKE STATES APPEARING AS AMICI CURIAE, ARE EITHER OUTSIDE THE ISSUES OF THIS CASE OR WITHOUT MERIT.

The contentions presented in points I, II, and III, of the brief for the Lake States, (page 12 to 29 of Argument), are a unit, and should be considered together.

Their substance is:

(a) That the Lake States are **absolute owners** of **all the waters** of the Lakes that were within their respective boundary lines when **admitted to statehood**, with the right **to have the said fixed quantity of water, plus all natural additions thereto, maintained as against any and all unnatural diversion or abstraction** (Lake States brief page 18);

(b) But since the "lower riparian owner on a stream may claim, as against the upper riparian owner, the right to a continued uninterrupted flow of the stream passing his lands," it follows, that a "lower state" on these lakes has a similar right "as against the upper states";

(c) While a riparian owner on a navigable stream can claim the right **to the use** of the water," the states' claim in this instance is to the full proprietary ownership of these waters";—therefore, the state's right thus being greater than that of a riparian owner—**the quantity** of the water under state ownership * * * was fixed and the State entitled to assert its sovereignty and ownership over such quantity and all natural additions thereto," (Brief page 17 to 18), consequently these Lake States can in this action, assert their said alleged rights as against this diversion at Chicago; and

(d) That Illinois, although a joint owner, was without right to authorize a diversion of the waters of the Great Lakes into another watershed, and thereby to provide for

"the extraordinary uses" of these waters by an agency of the state.

Concerning the above contentions we respectfully submit that:

(1) They are wholly irrelevant to the issues in the case at bar.

This is not a suit in equity to abate an alleged nuisance. It is not an original suit by the Lake States against Illinois to determine whether Illinois, as part owner of Lake Michigan, is making an unfair, inequitable, or unreasonable use of Lake waters. It is not even a suit by the Government to abate this diversion at Chicago, on the ground that it constitutes a substantial injury to navigability. This case is confined to the single issue, whether under Section 10, of the Act of 1899, Appellant's diversion of 10,000 cubic feet of water, is unlawful.

Upon this issue, the fact that these Lake States claim to own certain fixed proportions of the waters of the Great Lakes, is obviously of no consequence whatever.

(2) These contentions of the Lake States are based on a palpable misunderstanding of the established doctrines of this court, concerning the sovereign power of a state over navigable waters within its borders.

So far as concerns the issues in the case at bar, there is nothing peculiar to the Great Lakes or their waters, that distinguishes them from tide waters within a state, or waters of navigable rivers within a state or along its borders. There is no issue here concerning the title to lands bordering on or extending under any part of these Lakes, or concerning land between low water and high water marks, or concerning title upon such lands. All kinds of waters, tide, lake, and river—within a state, if in fact navigable for interstate commerce, would constitute part "of the navigable waters of the United

States" to which the Commerce Clause of the Constitution applies.

Concerning the sovereign rights and power of a state over navigable waters, including those of the Great Lakes, this court said, in *Ill. Cent. R. Co.* v. *Illinois*, 146 U. S. 387, at 435, (Heavy type ours):

> "It is settled law of this country that the ownership of, and dominion and sovereignty over, lands covered by tide waters, within the limits of the several states, **belong to the respective states within which they are found with the consequent right to use and dispose of any portion thereof, when that can be done without substantial impairment of the interest of the public in the waters, and subject always to the permanent right of Congress to control their navigation as far as may be necessary for the regulation of commerce with foreign nations and among the states.** * * *
>
> The same doctrine, in this court held to be applicable by lands covered by fresh waters in the Great Lakes, over which is conducted and extended commerce with different states and foreign nations."

But a state's ownership of such lands and its sovereignty over such waters, is not that of a private ownership; it is rather that of a sovereign trustee for the benefit of its public and for such reasonable uses as accord with the public welfare.

See *Ill. Cent. R. Co.* v. *Illinois*, 146 U. S. 387, at 457-8, where the court said:

> "Many other cases might be cited where it has been decided that the bed or soil of navigable waters is held by the people of the state in their character as sovereign in trust for public uses to which they are adapted, (citing cases)."

And at page 459 the court said:

> "The soil under navigable waters is held by the people of the state in trust for the common use and as a portion of their inheritant sovereignty. Any act of legislation concerning their use has to consider the public welfare. It is, therefore, appropriately within the exercise of the police power of the state."

We respectfully submit that a fundamental error of the above contentions for the Lake States, lies in their assumption that a state cannot change the common law rule regarding the right of a lower riparian owner to have the flow of a river continued.

The decisions of this Court have firmly established the doctrine, that a state may, out of its sovereign control and power over navigable waters within its borders, change this rule of the common law, and permit such reasonable uses, diversions and consumptions of its public waters, "for such purposes as it deems wise." (*U. S.* v. *Rio Grande Dam Co.*, 174 U. S. 690, at 702.)

In *Kansas* v. *Colorado,* (a diversion case), 206 U. S. 46, the court said, (heavy type ours) at page 93:

> "It is enough for the purpose of this case that each state has full jurisdiction over the lands within its borders, including the bottoms of streams and other navigable waters (Citing many cases).

And at page 94:

> **"It may determine for itself whether the common-law rule in respect to riparian rights or that doctrine which obtains in the arid regions of the West of the appropriation of waters for the purposes of irrigation shall control. Congress cannot enforce either rule upon any state** * * * At page 95—"But when the states of Kansas and Colorado were admitted into the Union they were admitted with the full powers of local sovereignty which belonged to other states (citing cases), and Colorado, by its legislation, has recognized the right of appropriating the flowing waters to the purposes of irrigation. Now the question arises between two states, one recognizing generally the common-law rule of riparian rights and the other prescribing the doctrine of the public ownership of flowing water. Neither state can legislate for, or impose its own policy upon the other. A stream flows through the two and a controversy is presented as to the flow of that stream. It does not follow, however, that because Congress cannot determine the rule which shall control between the two states, or be-

cause neither state can enforce its own policy upon the other, that the controversy ceases to be one of a justifiable nature, or that there is no power which can take cognizance of the controversy and determine the relative rights of the two states."

Thereupon the Court held that there was jurisdiction under the constitution to determine as between the two states, whether Colorado was unreasonably using its own property so as to inflict damage upon the neighboring state.

And in this case the court's decree did not disturb the existing diversions.

For additional cases in which this court has recognized the power of a state to change said common-law rule, see *Guittieres* v. *Albuquerque Land and Irr. Co.* 188 U. S. 545, at 533-554; *Boquillas* v. *Curtis,* 213 U. S. 339, at 344-345.

In *Leovy* v. *United States,* 177 U. S. 621, at 636, this Court held, that the act of a state in draining swamps for the purpose of protecting the health of its public, was a proper exercise of sovereign power even though such draining had the effect of partially impairing the navigability of neighboring waters.

In the case at bar, the state of Illinois, by appropriate legislation, has exercised its sovereign power over these waters within its borders, and has expressly authorized this division, thereby changing the common-law rule upon which are based the above contentions of the Lake States.

We therefore respectfully submit that under the above decisions of this court, said contentions are wholly without merit, and also have no place in a consideration of the issues here involved.

We do not contend that there are no limitations upon this sovereign power of Illinois. Its power is, of course, subject to the superior commerce power of Congress, if, and when Congress has properly acted. And an abuse of this power

by Illinois, may subject it to accountability for, or restraint upon, its action, in an appropriate original proceeding in this Court for said purpose. But the case at bar involves no such issues, and the fact that they are sought to be injected into this case by the Lake States cannot broaden the issues presented by this record.

(3) A further complete answer to the above contentions of the Lake States exists in the decision of this Court in *Missouri* v. *Illinois*, 200 U. S. 496, at 526, where the Court said:

> "Some stress was laid on the proposition that **Chicago is not on the natural watershed of the Mississippi**, because of a rise of a few feet between the Desplaines and the Chicago rivers. **We perceive no reason for distinction on this ground.** The natural features relied upon are of the smallest. And if, under any circumstances, they could affect the case, **it is enough to say that Illinois brought Chicago into the Mississippi watershed in pursuance, not only of its own statutes, but also of the acts of Congress of March 30, 1922** (*chap.* 14, 3 *Stat. at L.* 659), **and March 2, 1827** (*chap.* 51, 4 *Stat. at L.* 234), **the validity of which is not disputed.** *Wisconsin* v. *Duluth*, 96 *U. S.* 379, 24 *L. ed.* 668.)

(4) It is perhaps well, that the brief for the Lake States so frankly discloses their real and only substantial reason for objecting to this diversion at Chicago.

The unsubstantial nature of the claim of injury to the navigation interests of the Great Lakes has already been pointed out in the "statement" of this brief and is discussed at length in the brief for Appellant. But on pages 24 and 29 of the brief for the Lake States, many statements (most of which are not supported by any evidence in this record), are made concerning the interests of New York, Pennsylvania, Ohio, and Michigan, in the development of hydro-electric power at Niagara. It is at least a reasonable inference that the desire for greater profits from the sale of power, constitutes a much more urgent inducement for their opposition to this diver-

sion, than any fear that injury to navigation may result from such a slight (and easily compensated) lowering of Lake levels as this case presents.

We have already referred to the report appearing in the Congressional Record of the Rivers and Harbors Committee concerning the Niagara Falls Act of June 29, 1906, from which it appears that the Niagara River is a navigable stream in the greater part of its length, and that the State of New York, without at all seeking in any way the authority or approval of Congress, repeatedly authorized diversions from this River prior to 1906 **amounting in all to 26,700 cubic feet per second.** The Committee in its Report says:

> "It is a matter of some surprise that the companies which have proceeded to divert the waters of the River under the authority of the state of New York, have never appealed to Congress or to the Federal Government to confirm the authority granted by that State. It is thought best by the Committee that the Federal authority should now be exerted, not merely for the preservation of the scenic grandeur of Niagara Falls but for the maintenance of navigation and the proper control of the River as a boundary stream." (59 Congress, First Session, Report No. 4654, Congressional Record, June 2, 1906.)

In respect of this diversion at Niagara, much greater in amount than any diversion through the canal of Appellant, it would seem that the State of New York had no doubt as to its own sovereign power in the matter. Certainly New York is in no position to contend that Illinois could not exercise the same kind of sovereign power that New York itself thus exercised.

The facts, stated in the brief for the Lake States, concerning the present development of power at Niagara on the American side, show that the so-called "improved development" is under a main head of 215 feet. If the development were carried out to its full extent, the head would be in excess of 300 feet.

It therefore appears, that at the present time, approximately one-third of the available horse power at Niagara from the present authorized diversions, is wasted. Until this power is fully developed and this waste stopped, New York and its neighboring states, can hardly claim any very substantial injury from the diversion at Chicago. If the water now flowing into Appellant's canal were all to take its original course through the Niagara River, New York and its neighboring states, would not be obtaining any more power, because of New York's failure to properly develop their own authorized diversion.

The other contentions for the Lake States, and those made in the brief for the Lake Carriers Association, are already answered in this brief.

XII.

WITHOUT REGARD TO QUESTIONS OF LEGAL POWER, THE RELATIVE EQUITIES IN THE INSTANT CASE REQUIRE A REVERSAL OF THE DECREE.

Without regard to questions of power, the following considerations present equities which this Court should weigh:

a. If the decree be immediately enforced the health of all the inhabitants of Chicago and its surrounding communities—more than three million residents—will be endangered.

b. The importance of this consideration alone far outweighs all reasonable claim that there has been any discernible injury to navigation on the Lakes.

c. Any actual injury is more than offset by appellant's offer to do equity, by paying for the construction of compensating and regulating works which will restore and maintain lake levels.

d. In view of the practicability of restoring and maintain-

ing lake levels at relatively trifling cost, no decree should be permitted to defeat or hamper, or render prohibitive in cost, the established policy of the government to open and maintain a deep waterway from the Lakes to the Gulf.

e. In view of the feasibility of restoring and maintaining lake levels at relatively trifling cost without reducing the diversion at Chicago, no decree should subject the communities along the Illinois River and the Mississippi River, including the inhabitants of St. Louis, to the grave perils bound to follow an inadequate dilution of Chicago sewage.

f. In weighing the equities in respect of navigation alone, can there be any doubt that the importance of preserving and improving the navigability of the Lakes to the Gulf waterway for the benefit of these *amici curiae* and those they represent, far outweighs any equity for relief against a mere engineer's theory that injury to navigation on the Lakes has resulted from this diversion, although no Lake Captain has ever been found, able to perceive it?

(g) In weighing all the equities of this case, if the Court shall undertake to do so, can there be any doubt that the importance of protecting the health of the people of Chicago, St. Louis and other endangered communities, plus the importance of improving the navigability of the Lakes to the Gulf waterway in accord with the established public policy of Congress, far outweigh the importance of increasing the hydroelectric power at Niagara, the existence of which has stimulated these Lakes States into active opposition to Appellant's diversion?

We shall not attempt to elaborate the foregoing suggestions, believing that enough has already been said in the appellant's brief and this brief to bring to the court's attention the pertinent facts.

For the reasons herein stated, and upon the equities of the

case, we respectfully submit that the decree below should be reversed.

Respectfully submitted,

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WM. R. STAN

IN THE

Supreme Court of the United States.

OCTOBER TERM, A. D. 1924.

No. 161

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

THE UNITED STATES OF AMERICA,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES, FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

BRIEF AND ARGUMENT FOR THE STATES OF INDIANA, MICHIGAN, MINNESOTA, NEW YORK, OHIO, PENNSYLVANIA AND WISCONSIN AS AMICI CURIAE.

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IN THE

Supreme Court of the United States.

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

THE UNITED STATES OF AMERICA,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES,
FOR THE NORTHERN DISTRICT OF ILLINOIS,
EASTERN DIVISION.

BRIEF AND ARGUMENT FILED BY THE STATES OF INDIANA, MICHIGAN, MINNESOTA, NEW YORK, OHIO, PENNSYLVANIA AND WISCONSIN BY PERMISSION OF THIS COURT AS *AMICI CURIAE.*

STATEMENT OF THE CASE.

MAY IT PLEASE THE COURT:

The States of Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin, joining in this brief, have together with the State of Illinois extensive shore lines on the Great Lakes and all have a large volume of commerce on the Great Lakes, the waters of which

are being abstracted by the appellant. The State of Michigan alone has 1,624 miles of shore line. The Great Lakes with their connecting channels, constitute the most important system of inland navigation in the world. The traffic which passed through Detroit River, its busiest link, in 1910, amounted to 73,526,602 tons valued at about $771,000,000. About 80 per cent of this traffic is carried in large freight carriers, which are loaded down to the greatest draft that can be carried into the harbors or through the channels between the lakes; but could be loaded much deeper if the depth of water permitted. Some of the larger of the vessels carry an additional load of 85 tons for each inch of additional draft. Every inch added to the navigable depth of water would therefore be of material benefit to commerce.

The Great Lakes constitute a series of enormous natural reservoirs, each of which serves to regulate the flow in the river constituting its outlet and to maintain the lake below. They are interdependent. The study of one, to be complete, must include the study of all. The total area drained by the Great Lakes is about 287,688 square miles. Of this total about one-third is occupied by the lakes themselves; that is, devoted to reservoir purposes. The result is a uniformity of level and a uniformity of flow which are truly wonderful—a perfection of regulation which no work of man ever did or ever will approach. (Rec., Vol. 4, p. 3435.)

The division of the waters between the Great Lakes Basin and the Mississippi River Basin is known as the Continental Divide, an elevation of land in the State of Illinois within a few miles of Chicago. The Calumet and Chicago Rivers by their natural flow are properly within the Great Lakes Basin and drain into the waters of Lake Michigan. The natural flow of the waters of Lake Mich-

igan is northerly. The natural flow of the Des Plaines and Illinois River is into the Mississippi River Basin. The boundaries of the various states bordering on the Great Lakes are so extended as to include the lands under and the waters of the Great Lakes within the limits of the boundaries of the federal government. While permission to file briefs as *amici curiae* was but recently granted, to these states, citizens and municipalities of these respective states have been active for years in their opposition to the abstraction of these waters. This is apparent by reference to the record (Vol. 6, Exhibit of proceedings before the Secretary of War in connection with application of the Sanitary District for permission to divert 10,000 cubic feet of water—1912).

> "There is owned at this port several freighters of the largest class of freighting ships in the world. They combine and carry in one cargo more than one and one-half million tons from Lake Superior to the lower lakes. The depth of the connecting rivers are affected by the levels of Lakes Huron and Michigan.—The lowering of these rivers seriously affects the carrying capacity of these large steamers and we earnestly protest against—any diversion."
>
> Duluth Commercial Club, Minnesota—Rec., Vol. 6, page 3737.

> "Milwaukee Harbor Commission now engaged in the task of devising means of improving present harbor conditions and formulating plans for the city harbor * * * regards with solicitude the apparent increasing * * * lower water levels in the Great Lakes, which, if continued, must result in added expense for river and harbor maintenance and great depreciation in carrying capacity of lake tonnage."
>
> Secretary, Milwaukee Harbor Commission, Rec., Vol. 6, p. 3739.
>
> Resolutions, Merchants & Manufacturers' Association of Milwaukee, Rec., Vol. 6, p. 3739.
>
> Governor of Wisconsin, Rec., Vol. 6, p. 3740.

"Every inch of the present depth in Manitowoc River is of great value to this city and to thousands of shippers both east and west of this port."

Mayor of Manitowoc, Rec., Vol. 6, p. 3740.

To same effect:

Mayor of Marinette, Rec., Vol. 6, p. 3740.

Marinette Chamber of Commerce, Rec., Vol. 6, p. 3742.

Mayor and Common Council of Sheboygan, Wis., Rec., Vol. 6, p. 3742.

Mayor and Common Council of DePere, Wis., Rec., Vol. 6, p. 3742.

Mayor and Common Council of Green Bay, Wis., Rec., Vol. 6, p. 3743.

"Every port in Michigan will be injured; every fruit farm in Western Michigan jeopardized and the future development of the State hindered."

House of Representatives, Michigan, Vol. 6, p. 3744.

State Senate of Michigan, Vol. 6, p. 3743.

See also:

Letter of J. C. McLoughlin, Member of Congress, Rec., Vol. 6, p. 3744.

Mayor and Chamber of Commerce, Charlevoix, Mich., Rec., Vol. 6, p. 3745.

Mayor and City Council of Escanaba, Mich., Rec., Vol. 6, p. 3745.

Mayor of City of Petoskey, Mich., Rec., Vol. 6, p. 3746.

Mayor of City of Muskegon, Mich., Rec., Vol. 6, p. 3746.

(Diversion) "Would be fraught with detrimental results to the harbor of the City of Toledo."

Ohio, Toledo Commerce Club, Rec., Vol. 6, p. 3747.

Cleveland Chamber of Commerce, Rec., Vol. 6, p. 3748.

Board of Control of Sandusky, Ohio, Rec., Vol. 6, p. 3749.

Sandusky (Ohio) Business Men's Association, Rec., Vol. 6, p. 3749.

"Government records show that up to June 30, 1911, federal authorities had spent at Buffalo and Black Rock in waterway improvements * * * $7,932,380.68; and during the same period the citizens of Buffalo expended in the improvements of its harbor, $4,880,149.20 * * *. The level of Lake Erie was one foot five inches lower in 1911 than in 1908, attributed not only to natural causes, but to the diversion of water from Lake Michigan under the present permit. This condition in the past few years has resulted in the lowering of the loading capacity of vessels, which has been reflected in the rates charged, causing loss not only to the shipping interests but to the commercial interests as well, and as the tendency is to build larger and larger boats in order to reduce the transportation cost to a minimum, any action that will interfere with the operation of the large boats should be viewed as a public calamity."

Harbor and River Committee, Buffalo Chamber of Commerce, Rec., Vol. 6, pp. 3749-50.

Shipmasters' Association, Buffalo, Rec., Vol. 6, p. 3751.

Shipmasters' Association, Ogdensburg, N. Y., Rec., Vol. 6. p. 3751.

Lockport (N. Y.) Board of Trade, Rec., Vol. 6, p. 3752.

"The present current makes navigation (in Chicago River) difficult and any increase would seriously impair movement of vessels if not make impos-

sible handling of goods to and from industries located on river."

Signer, Association of Lake Lines, Rec., Vol. p. p. 3753.

Niagara Falls Power Co. (N. Y.), Rec., Vol. 6, p. 3754.

"During the year 1911, the critical points in the lake routes were six inches lower than the average level for the last fifty years. There is invested in lake shipping some $200,000,000.00—carrying capacity of vessels during the year 1911, was reduced over ten per cent, due to the lowering of lake levels by natural causes which must have been aggravated by the new outlet at Chicago."

Shenango Furnace Co., Pittsburgh, Pa., Rec., Vol. 6, p. 3754.

A reading of the record presented in this case shows clearly that the abstraction of the waters from Lake Michigan reduces materially the levels of all the Great Lakes and connecting waters, with the exception of Lake Superior. However, navigation of Lake Superior is materially affected by any lowering of the levels of the lower lakes and connecting waters; these determining the depths to which a boat could load in navigating to or from points, in Lake Superior and the other Great Lakes.

"The shoalest spot is the one that governs." (Appellant's narrative statement, page 147.)

The lowering of the lake levels was proceeded with by the appellant upon the theory that it was, in any event, entitled to use so much of the waters of Lake Michigan as it needed for its corporate use, and at least that the United States had authorized the consequent obstruction to navigation occasioned by such abstraction of waters. All of these contentions the states deny, the states tak-

ing the position that the waters in the Great Lakes belong to the states; held by them in trust for the use of their citizens, and that no one state or state agency may abstract these waters to the injury of the rights of the other states therein without the explicit assent of these other states; that under no circumstances can any one state, or a state agency or municipal corporation of any state, divert the waters naturally belonging to the Great Lakes Basin, so that these waters are forever lost to this basin; that the United States has not a proprietary right to these waters and is limited in the use thereof to the right of Congress to regulate the commerce carried on by means of these waters between states or between states and foreign nations.

Within the short time (Appellant's Narrative and Statement of the Pleadings, etc., together with Brief, were received by us October 22, 1924) given to the states, it was deemed inadvisable to attempt the preparation of a statement of the case independently from that statement prepared and presented in the brief of the government filed herein, and for the purposes of the presentation of the states' brief herein it is respectfully urged and prayed that we may adopt as our statement of the case, in so far as it meets the positions taken by us, the government's statement.

BRIEF.

Points and Authorities.

I.

THE STATES BORDERING ON THE GREAT LAKES, UPON BEING ADMITTED TO FULL RIGHTS OF STATEHOOD, RESPECTIVELY ACQUIRED A PROPRIETARY OWNERSHIP IN ALL THE WATERS IN THE GREAT LAKES WITHIN THE BOUNDARY LINES, AS THEN ESTABLISHED, OF THE STATES.

Martin v. *Wadell*, 16 Pet. 367, 10 U. S. (L. Ed.) 997.

Pollard v. *Hagan*, 44 U. S., 3 How. 212 (11:565).

Manchester v. *Massachusetts*, 139 U. S. 240.

Illinois Central R. Co. v. *Illinois*, 146 U. S. 387.

Kansas v. *Colorado*, 206 U. S. 46.

Port of Seattle v. *Oregon & Wash. R. Co.* 255 U. S. 56.

Barney v. *Keokuk*, 94 U. S. 324, 24 L. Ed. 224.

II.

AS OWNERS OF THE WATERS IN THE GREAT LAKES WITHIN THE BOUNDARIES OF THE RESPECTIVE STATES, THE STATES ARE ENTITLED AT ALL TIMES TO HAVE ALL THE WATERS COMING NATURALLY TO THEM, YIELDING ONLY, IF AT ALL, TO THE DEMAND OF PUBLIC COMMERCIAL NECESSITY AS ASSERTED BY APPROPRIATE CONGRESSIONAL ACTION.

Kansas v. *Colorado*, 206 U. S. 46.

Hodge v. *Eaton*, 135 Fed. 411-414.

Hudson County Water Co. v. *McCarter*, 209 U. S. 349.

Farnham on Waters (1904), Vol. I, p. 29-602.
Holyoke Water Power Co. v. *Conn. River Co.* 20 Fed. 71.
Pine v. *New York*, 112 Fed. 98.
U. S. v. *Rio Grande*, 174 U. S. 690.
Missouri v. *Illinois*, 180 U. S. 208.

III.

THE STATE OF ILLINOIS WAS WITHOUT RIGHT AS A STATE TO AUTHORIZE THE ABSTRACTION OF THE WATERS OF THE GREAT LAKES AND CONNECTING WATERS SO AS TO PERMANENTLY DIVERT THESE WATERS INTO ANOTHER WATERSHED; AND PROVIDE FOR THE EXTRAORDINARY USES OF THESE WATERS BY A STATE AGENCY OR MUNICIPAL CORPORATION OF THE STATE.

Economy Light & Power Co. v. *U. S.* 256 U. S. 113, 65 L. Ed. 847.
New York City v. *Pine*, 185 U. S. 93, 46 L. Ed. 820.
Sands v. *Manistee River Imp. Co.* 123 U. S. 288, 31 L. Ed. 149.
Farnham on Waters, Vol I, p. 59.
Withers v. *Buckley*, 20 How. 84, 15 L. Ed. 816.
Mobile County v. *Kimball*, 102 U. S. 691, 26 L. Ed. 238.
Hyde on International Law (1922), Vol. I, pp. 315-316.
Holyoke Water Power Co. v. *Conn. River Co.* 20 Fed. 71.
Ferguson v. *Arthur*, 117 U. S. 482.
Huse v. *Glover*, 119 U. S. 544, 30 L. Ed. 488.

IV.

CONGRESS HAS NOT AUTHORIZED ANY ABSTRACTION OF THE WATERS OF LAKE MICHIGAN AS IS CLAIMED BY APPELLANT.

(a) The Act of Congress of March 2, 1827, cannot be construed as authorizing any diversion or abstraction of waters from Lake Michigan.

(b) The Secretary of War was without power to authorize any abstraction of such waters.

Hubbard v. *Fort*, 188 Fed. 987.

Act of Congress, March 2, 1827 (4 Stats. at L., p. 234).

Act of Congress, March 2, 1833 (4 Stats. at L., U. S., p. 662).

Burke v. *Snively*, 208 Ill. 328.

Chicago v. *Green*, 238 Ill. 258.

People v. *Nelson*, 133 Ill. 565.

Separate Section 3, Constitution of Illinois, 1870.

U. S. v. *Rio Grande Dam & I. Co.* 174 U. S. 706.

V.

CONGRESSIONAL AUTHORITY FOR ABSTRACTION OF WATERS OF LAKE MICHIGAN MUST BE BASED SOLELY UPON COMMERCIAL IMPROVEMENT OF THE WATERS OF LAKE MICHIGAN OR IMPROVEMENT OF COMMERCE.

(a) Congress has no authority to authorize diversion except as exercised under its constitutional power to regulate commerce.

(b) The only right in and to the waters of Lake Michigan on the part of Congress is the right to use these

waters as an avenue of commerce or commercial regulation.

Farnham on Waters, Vol. I, p. 59.
Withers v. *Buckley,* 20 How. 84, 15 L. Ed. 816.
Mobile County v. *Kimball,* 102 U. S. 691.
Depew v. *Wabash & E. Canal,* 5 Ind. 8.
Port of Seattle v. *Oregon & Wash. Ry. Co.* 255 U. S. 56, 65 L. Ed. 500.

ARGUMENT.

I.

THE STATES BORDERING ON THE GREAT LAKES, UPON BEING ADMITTED TO FULL RIGHTS OF STATEHOOD, RESPECTIVELY ACQUIRED A PROPRIETARY OWNERSHIP IN ALL THE WATERS IN THE GREAT LAKES WITHIN THE BOUNDARY LINES, AS THEN ESTABLISHED, OF THE STATES.

In the case of

The Port of Seattle v. *Oregon & Washington Ry. Co.* 255 U. S. 56, 65 L. Ed. 500,

on the question as to whether or not the Oregon & Wash. Ry. Co. acquired, as owner of lands adjoining sea waterway in The Port of Seattle, the right to build in the waterway piers, wharves and other structures over which it could secure access from its land to the navigable channel, Mr. Justice Brandeis, in delivering the opinion of the court, said:

> "The right of the United States in the navigable waters within the several states is limited to the control thereof for purposes of navigation. Subject to that right Washington became, upon its organization as a state, the owner of the navigable waters within its boundaries and of the land under the same. (*Weber* v. *State Harbor Com.* 18 Wall. 57, 21 L. Ed. 798.) By section one of article 17 of its Constitution, the state asserted its ownership in the bed and shore 'up to and including the line of ordinary high tide, in waters where the tide ebbs and flows.' The extent of the state's ownership of the land is more accurately defined by the decision of the highest court, as being the land below high-water mark, or the meander line, whichever of these lines is the lower. The character of the state's ownership in the land and in the waters is the full proprietary

right. The state, being the absolute owner of the tide lands and of the waters over them" * * *

In

Barney v. *Keokuk*, 94 U. S. 324, 24 L. Ed. 224,

the court said:

"and since this court, in the case of *The Genesee Chief* v. *Fitzhugh*, 12 How. 443, 13 L. Ed. 1058, has declared that the Great Lakes and other navigable waters of the country, above as well as below the flow of the tide, are, in the strictest sense, entitled to the denomination of navigable waters, and amenable to the admiralty jurisdiction, there seems to be no sound reasons for adhering to the old rule as to the proprietorship of the beds and shores of such waters. It properly belongs to the states by their inherent sovereignty, and the United States has wisely abstained from extending (if it could extend) its survey grounds beyond the limits of high water."

Above citation was quoted with approval by Mr. Justice Brewer in *Kansas* v. *Colorado*, 206 U. S. 46.

Touching upon this matter, in the case of

Martin v. *Wadell*, 16 Pet. 367, 10 U. S. L. Ed. 997,

the court held:

"That when the American Revolution was concluded, the people of each state became themselves sovereign, and in that character held the absolute right to all their navigable waters and the soils under them for their own common use, subject only to the rights since surrendered by the Constitution to the general government."

See also,

Pollard v. *Hagan*, 44 U. S., 3 How. 212 (11:565).
Manchester v. *Massachusetts*, 139 U. S. 240.
Illinois Central R. Co. v. *Illinois*, 146 U. S. 387.

II.

AS OWNERS OF THE WATERS IN THE GREAT LAKES WITHIN THE BOUNDARIES OF THE RESPECTIVE STATES, THE STATES ARE ENTITLED AT ALL TIMES TO HAVE ALL THE WATERS COMING NATURALLY TO THEM, YIELDING ONLY, IF AT ALL, TO THE DEMAND OF PUBLIC COMMERCIAL NECESSITY AS ASSERTED BY APPROPRIATE CONGRESSIONAL ACTION.

"A river which flows through the territory of several states or nations is their common property. Each is entitled to its navigation throughout its whole extent, so far as it can be exercised without injury to the rights of others. It is a great natural highway conferring, besides the facilities of navigation, certain incidental advantages, such as, fishery and the right to use the water for power. Neither nation can do any act which will deprive the other of the benefits of those rights and advantages. The inherent right of a nation to protect itself and its territory would justify the one lower down the stream in preventing by force the one further up from turning the river out of its course or in consuming so much of the water for purposes of its own as to deprive the former of its benefit. * * * Courts, having a supervisory jurisdiction over the acts of the political department of government, will prevent acts by that department which will injure the rights of the neighboring states. The gifts of nature are for the benefit of mankind, and no aggregation of men can assert and exercise such rights and ownership of them as will deprive others having equal rights, and means of enjoying them, of such enjoyment. The acts of nations must be governed by principles of right and justice. The days of force and self-aggrandizement at the expense of neighboring nations are passed, and the common right to enjoy the bountiful provisions of Providence must be preserved."

Farnham on Waters (1904), Vol. I, p. 29.

Hudson County Water Co. v. *McCarter*, 209 U. S. 349.

This is a case in which the defendant under a contract with the City of Bayonne, in New Jersey, first laid mains in that city for the purpose of carrying waters to Staten Island in the State of New York. By their contracts it is to get the water from the Passaic River at Little Falls, where the East Jersey Water Co. has a large plant by which the water is withdrawn. The State of New Jersey enacted legislation making it unlawful for any person or corporation to transport or carry the waters of any lake or pond or stream in the state into another state for use therein. In the opinion, delivered for the court by Mr. Justice Holmes, it was said:

> "We are of the opinion further that the constitutional power of the state to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use or speculation as to future needs. * * * It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one a reason for its will."

In discussing this case in the lower court, 70 New Jersey Equity 695, Justice Pitney said:

> "It will, of course, be observed that the case before us is not at all parallel to the case that would be presented were the state of New Jersey or citizens thereof setting up a right to interfere with the flow of water that otherwise would, in its natural course, reach the territory of a neighboring state. Such a case was presented in *New York City* v. *Pine*, 185 U. S. 93, 22 U. S. Sup. Ct. Rep. 592. There the City of New York constructed a dam on the west branch of Byram River, within the state of New York, this being a non-navigable stream of fresh water arising in New York, flowing thence through the state of Connecticut, and emptying into Long Island Sound. The plaintiffs were riparian owners of land in the state of Connecticut, and brought action in federal Circuit Court for an injunction to restrain the city from diverting the waters of the west branch from their natural flow through the

plaintiff's lands. *The Supreme Court assumed, without deciding, that although the west branch above the dam and all the sources of the supply of water to that branch are within the limits of the state of New York, that state has no power to appropriate such water or prevent its natural flow through through its customary channel into the state of Connecticut.* The injunction was denied, however, and the right of the plaintiffs to pecuniary compensation established in its stead, on the ground of their acquiescence in the construction of the works by means of which the diversion was to be effected.

In the great case of *Kansas* v. *Colo.* 185 U. S. 125, 22 U. S. Sup. Ct. Rep. 592 (decided on demurrer, but not yet determined on final hearing), the state of Kansas, partly on the basis of its ownership of riparian land upon the Arkansas River and partly in the right of its citizens who are riparian owners thereon, is seeking to enjoin the state of Colorado from withdrawing from the river for irrigation of the arid lands of Colorado so much of the waters of the river as to materially injure the riparian lands in Kansas. A demurrer to the bill was overruled on the ground that in a case of so great importance a determination of the questions involved ought to be left until the facts were established by proofs. *Impliedly the right to prevent an undue interference with the natural flow of the river was recognized.*"

In the *Hodge* v. *Eaton*, 135 Fed. 411, in a suit by settlers in Wyoming, on a stream which arises in Colorado, to restrain the diversion of water from such stream in Colorado, the court stated the following to be a general principle:

> "*The idea of an exclusive right in the people of a state to divert its running waters to the injury of riparian owners in another state must be equally unattainable. Indeed, the doctrine of riparian ownership and use of running water is not subject to political boundaries. Between hostile states the doctrine must be recognized, but any such repudiation would be simply vis major. Between states dwelling in peace and concord, as are the states of our Union, the equal rights of the inhabitants of*

each state to the waters of intersecting streams must always be recognized.''

One state cannot authorize changes in the river which will injure property in another state.

Holyoke Waterpower Co. v. *Connecticut River Co.* 52 Conn. 570; 22 Blatchf. 131, 20 Fed. 71,

and the upper state cannot divert the water to the injury of property or the destruction of navigation lower down, and attempts to do so will be restrained by courts having jurisdiction of the parties.

Pine v. *New York,* 50 C. C. A. 145, 112 Fed. 98.
Kansas v. *Colo.* 185 U. S. 125, 46 L. Ed. 838, 22 Sup. Ct. Rep. 552.
U. S. v. *Rio Grande,* 174 U. S. 690, 43 L. Ed. 1136.

Nor has the upper state a right to pollute the water in such a way as to render it unfit for domestic use in the lower one.

Missouri v. *Illinois,* 180 U. S. 208, 45 L. Ed. 497, 21 Sup. Ct. Rep. 331.

In support of the contentions herein urged, reference is made to the case of

Kansas v. *Colorado,* 206 U. S. 46.

The waters of the Great Lakes are owned by the respective states in a proprietary sense. The holding is in trust for all its citizens for uses of navigation, fishing, etc. The holding by the state is not in the strict sense that of a riparian owner, that right to the use of waters arising from being the owner of the banks along a stream, but is rather in the capacity of a conservator, standing ever as the guardian of the people's right to use these waters for navigation and other lawful uses, seeing that these uses are in no way ever curtailed or destroyed. As

to these Great Lakes, the duty of each state to the other is to so use these waters as not to abridge to any extent the rights of the other states. If the lower riparian owner on a stream may claim, as against the upper riparian owner, the right to a continued, uninterrupted flow of the stream passing his lands, why may not the lower state then claim, as against the upper state, the same right as one of its citizens could claim against a citizen of another state? While a riparian owner on a navigable stream can claim but the right to the use of the water, the states' claim in this instance is to the full proprietary ownership of these waters. True, that the waters themselves being of a wandering, transient nature, the precise waters which were within the boundaries of the particular border state when admitted to the Union did not continue to remain in the state, and when these waters passed out in a natural manner the state lost its property in them, but at the same time gained a property to those waters naturally coming in to replace those naturally leaving. But, at the time of its admission into the Union, the quantity of the waters under state ownership and sovereignty was fixed and the state was entitled to assert its sovereignty and ownership over such quantity and all natural additions thereto as against any and all unnatural diversion or abstraction.

III.

THE STATE OF ILLINOIS WAS WITHOUT RIGHT AS A STATE TO AUTHORIZE THE ABSTRACTION OF THE WATERS OF THE GREAT LAKES AND CONNECTING WATERS SO AS TO PERMANENTLY DIVERT THESE WATERS INTO ANOTHER WATERSHED AND PROVIDE FOR THE EXTRAORDINARY USES OF THESE WATERS BY A STATE AGENCY OR MUNICIPAL CORPORATION OF THE STATE.

Appellant attempts to justify its right to abstract these waters from Lake Michigan, and indeed any amount of water which the State of Illinois may determine as proper, by reason of the powers conferred upon it under the Illinois Act of May 29, 1889 (Appellant's Brief and Argument, p. 155) asserting that the State of Illinois has reserved to it the police power to take the amount of water reasonably required for the purposes designed—namely, the protection of the water supply of Chicago and its environs.

The states herein recognize the principle that Illinois, under its police powers, should take all necessary steps to protect the water supply of the state, but it is respectfully submitted that in the exercise of this police power the State of Illinois was not justified in authorizing any unreasonable use and abstraction of the waters of the Great Lakes to the injury of the navigability of the Great Lakes and connecting waters, and the rights of the respective border states to their respective rights to the use of these same waters for navigation, development of water power and other lawful uses.

That the use of these waters being made by appellant is an extraordinary use; that is, extraordinary as to the

purpose for which the water is taken as well as the amount of water used, needs no argument.

It is undisputed in the record that the abstraction of 10,000 cubic second feet of water by appellant reduces the levels of the Great Lakes and connecting waters at various places of from four and five-tenths inches to six and nine-tenths inches, and that any reduction of the levels of these waters necessarily tends to nullify costly improvements heretofore made throughout the Great Lakes, both by the states and the federal government, and that a withdrawal of 10,000 cubic feet per second would nullify the expenditures made throughout the Great Lakes under authority of Congress to the amount of many millions of dollars, as well as inflicting a great loss on the navigation interests using these waters, and a loss to the states using these waters for power purposes. (See Rec., Vol. 8, pp. 52, 53, 54.)

In

Economy Light & Power Co. v. *U. S.* 256, pp. 113, 65 L. Ed. 847,

suit was brought by the United States to restrain defendants from constructing a dam in the Des Plaines River at a point in Grundy County, Ill., without the consent of Congress or authority of the legislature of the state:

> "The public interest in navigable streams of this character in Illinois and neighboring states, and the Federal authority over such as are capable of serving commerce among the states, do not arise from custom or implication, but have a very different origin. By article 4 of the compact in the Ordinance of July 13, 1787, for the government of the territory northwest of the River Ohio, it was declared: 'The navigable waters leading into the Mississippi and St. Lawrence, and the carrying places between the same, shall be common highways, and forever

free, as well to the inhabitants of the said territory, as to the citizens of the United States, and those of any other states that may be admitted into the Confederacy, without any tax, impost or duty therefor.'" * * * "To the extent that it pertained to internal affairs, the Ordinance of 1787—notwithstanding its contract form—was no more than a regulation of territory belonging to the United States, and was superseded by the admission of the state of Illinois into the Union 'on an equal footing with the original states in all respects whatever.' *But so far as it established public rights of highway in navigable waters capable of bearing commerce from state to state, it did not regulate internal affairs alone, and was no more capable of repeal by one of the states than any other regulation of interstate commerce enacted by the Congress.*"

In construing the provisions of the fourth section of the ordinance for the government of the northwest territory (Ordinance of 1787), Mr. Justice Fields said:

> "The provision of the clause that the navigable streams should be highways without any tax, impost or duty *has reference to their navigation in their natural state. It did not contemplate that such navigation might not be improved by artificial means, by the removal of obstructions or by the making of dams for deepening the waters, or by turning into the rivers waters from other streams to increase their depth.*"
>
> *Huse* v. *Glover*, 119 U. S. 544, 30 L. Ed. 488.

It does then appear that the provisions of the ordinance of 1787, for the government of the northwest territory, in so far as these provisions establish the public rights of interstate navigation in the Great Lakes still remain as binding upon all the states in their relation to each other and to the federal government. The right of navigation is the first great right to which these

waters are dedicated, and any other use of these waters affecting their navigable capacity is prohibited.

> "Any duty imposed upon a riparian state, either by international law or by contract to maintain the navigability of an international river, implies an obligation also to check within places subject to the control of such state the commission of any acts which, unless restricted would prove injurious to navigation.
>
> This obligation would seem to render improper the tolerance of any diversion productive of such an effect even though it should occur at a point where the river ceased to be navigable and lay wholly within the domain of the acquiescent territorial sovereign."
>
> Hyde International Law, 1922, Vol. 1, 315-316.

In

New York v. *Pine*, 185 U. S. 93, 46 L. Ed. 821,

Mr. Justice Brewer, delivering the opinion of the court, said:

> "Without deciding, *we assume that*, although the west branch above the dam and all the sources of supply of water to that branch are within the limits of the state of New York, it has no power to appropriate such water or prevent its natural flow through its accustomed channel into the state of Connecticut; that the complainants have a legal right to the natural flow of the water through their farms in the state of Connecticut and cannot be deprived of that right by and for the benefit of the City of New York or by any legal proceedings either in Connecticut or New York."

In

County of Mobile v. *Kimball*, 102 U. S. 691, 26 L. Ed. 238,

> "The improvement of harbors and bays and navigable rivers *within the states* may be regulated by state authority, *if it does not impair their free navigation as permitted under the laws of the United*

States, nor defeat any system for the improvement of their navigation provided by the general government."

In

Holyoke Water Power Co. v. *Connecticut River Co.* 20 Fed. p. 71,

"The improvement of the navigation of navigable rivers within a state is a part of the state's governmental duties * * * and * * * the riparian proprietor within the state is subject to the just exercise of this (governmental) power. The land is under the jurisdiction of the state and the state derives the power to inflict remote and consequential injuries upon it by virtue of such jurisdiction. Jurisdiction confers the power and the right to inflict consequential injury, but where no jurisdiction exists, the right ceases to exist. It is a recognized principle that the statute of one state in regard to real estate cannot act extraterritorially. As Connecticut has no direct jurisdiction or control over real estate situate in another state, it cannot indirectly, by virtue of its attempted improvement of its own navigable waters, control or subject to injury foreign real estate."

If as proprietors of these waters the states cannot object when one of the states insists upon taking these waters and forever destroying them by abstraction so that these states are denied any future use of these waters, it would seem absurd for the courts to say that the states' right to these waters is a "full proprietary one."

"'Proprietary' as defined by the Imperial Dictionary, means belonging to; ownership, as proprietary rights. By Webster, as belonging or pertaining to a proprietor; 'proprietor' being defined as one who has the legal right or exclusive title to anything whether in possession or not; an owner."

Ferguson v. *Arthur*, 117 U. S. 482, 29 L. Ed. 979.

Here one state desires to take away from each of these states of from three to five inches level of the Great Lakes' waters. Should Illinois authorize a municipal corporation of that state to dump solid matter on the bottom of all the lakes to an extent of three-inch thickness, there would be no question about the right of the other states to prevent this, and certainly such offending municipal corporation could not justify its act on the grounds of permission derived from an Illinois state statute. When the Illinois statute attempted to give to the appellant the right to abstract waters from Lake Michigan for the extraordinary purpose of washing sewage away from the City of Chicago and its environs, and in the extraordinary amounts indicated in the statute, it was in effect granting to the appellant the right to take property belonging to all of these states and this, obviously, it could not do.

The withdrawal from Lake Michigan through the Drainage Canal of 10,000 c. f. s. obviously means so much less flowing through the Niagara and St. Lawrence Rivers. The aggregate fall or head on the Niagara and that part of the St. Lawrence forming the international boundary line, is approximately 400 feet. This amount of water if allowed to flow in its natural course is capable of developing on the St. Lawrence and Niagara Rivers 400,000 constant horsepower of electrical energy—the equivalent of from three to four millions tons of coal—annually.

The State of New York is more directly interested in the question of hydro-electric power development, than the other states in whose behalf this brief is presented, but the States of Pennsylvania, Ohio and Michigan, on account of their proximity to the Niagara and St. Lawrence Rivers, are deeply interested in this question.

Hyro-electric power developed on the St. Lawrence and Niagara Rivers may very easily be made available for use in the three states last mentioned. It is a fact that there is now being constructed by the New York, Lockport & Ontario Power Company, a transmission company in the western part of New York state, a transmission line from Niagara Falls to Warren, Pa., to connect with the transmission lines of the Pennsylvania Electric Corporation, which last named company has transmission lines extending across the State of Pennsylvania into the State of Maryland.

The development and distribution of 400,00 hydro-electric horsepower among the industries of these four states means a tremendous saving in the coal resources of the country, and as a broad proposition is of sufficient importance to the public to require the Sanitary District, within a reasonable time, to replace the present unscientific system for sewage disposal with some other more scientific and standardized system.

In presenting this point and the above statement, we have not overlooked the testimony of Mr. Isham Randolph, consulting engineer for the Sanitary District, found in the record, Vol. VI, at pages 3598, 3599. Mr. Randolph has undertaken to state the value to the Sanitary District of the power capable of development from the 10,000 c. f. s. diverted through the drainage canal. His statement that 30,000 horsepower can be developed at Lockport is substantially correct. His further statement of the amount of power capable of development from 14,000 c. f. s. is also substantially correct, but the significance of the statement of the amount of power capable of development from 14,000 c. f. s. is that it is the intention of the Sanitary District to ultimately withdraw 14,000 c. f. s. rather than to be limited to the withdrawal of even 10,000 c. f. s.

The amount of power capable of development from 10,000 c. f. s. and 14,000 c. f. s. respectively, on the Des Plaines and Illinois Rivers below Lockport, is not a material fact in the determination of the question before this court. If any weight is to be given to the fact that the withdrawal of 10,000 c. f. s. or 14,000 c. f. s. from Lake Michigan, through the Des Plaines and Illinois Rivers by way of the drainage canal, increased the volume of water flowing through these rivers and thereby makes possible a development of any amount of power, the question resolves itself into one of water power or hydro-electric power development, and we are getting away from the proposition that the real and avowed purpose of the Sanitary District in withdrawing water from Lake Michigan, under the Illinois statute, is to provide a system of sewage disposal for the people of Chicago and adjacent territory.

Mr. Randolph has further undertaken to state the amount of power that 10,000 c. f. s. will develop at Niagara Falls on the Niagara River, and also he has undertaken to state the price at which power sells at Niagar Falls, to wit, $9.50 per horsepower. He has not qualified or shown that he has any knowledge of the price at which power is sold at Niagara Falls. His statement that 10,000 c. f. s. developed by the *Shellcock* Company (Schoellkopf Company), under a head of 200 feet, and 80 per cent efficiency, will produce 181,000 horsepower, is erroneous. It is a fact well known to the War Department, and other departments of the government, that the development of the Schoellkopf Company is under a mean head of 215 feet; that its efficiency is above 90 per cent; and, that the amount of power which it is actually producing from the use of 19,500 c. f. s. is over 400,000 horsepower.

The above is a statement of present conditions. Mr. Randolph, in his testimony, referred to conditions in the year 1914 which were somewhat different from the present conditions. His statement that power sells at Niagara Falls for $9.50 per horsepower is obviously erroneous. It is a fact well known and understood among engineers and in the hydro-electric world generally, that on the Canadian side, at Niagara Falls, at an early date, a contract was made by one company for the sale of hydro-electric power at that price. No hydro-electric power has ever been sold at that price on the American side. We are assured by the Niagara Falls Power Company (the successor of the Schoellkopf Company and other companies), the only company developing hydro-electric power on the American side of the Niagara River, that the average price of hydro-electric power developed on the American side of the Niagara River, for several years before the year 1914, was not less than $16 per horsepower, and that the price for which such power has sold from that time to the present time is $20 per horsepower.

The Sixty-fifth Congress, by Public Resolution No. 8, authorized the Secretary of War, among other things,—

> "To make a comprehensive and thorough investigation, including all necessary surveys and maps, of of the entire subject of water diversion from the Great Lakes and the Niagara river, including navigation, sanitary and power purposes, and the preservation of the scenic beauty of Niagara Falls and the rapids of Niagara river, and to report to Congress thereon at the earliest practicable date."

The work provided for by the above resolution was entrusted by Major General Beach, chief of engineers of the army, to Col. J. G. Warren, corps of engineers, division engineer, Lake Division. The work entrusted to Colonel Warren was undertaken by him and his as-

sistants, and performed with great thoroughness. The work was completed by him in 1919, and on August 30th of that year he made his report to the chief of engineers of the United States Army. On November 19, 1920, the chief of engineers transmitted this report to the Secretary of War. On the 7th of December, 1920, the Secretary of War transmitted the same to the Congress. This report is commonly known as "The Colonel Warren Report," and is the best authority extant on the subjects therein treated.

This subject is quite fully discussed in Colonel Warren's report at pages 93, 94, 398, 399, 400. On pages 93 and 399, there are statements showing the comparative cost of producing steam electric power and hydro-electric power at Niagara Falls, and the estimated price at which such power might be sold in large blocks to the public. The estimated price of steam electric power to the public, in large blocks, is $50.70 per horsepower, while the estimated price of hydro-electric power to the public, in large blocks, is $19.50 per horsepower.

The purpose of referring to Mr. Randolph's testimony is to point out to the court that certain statements made by him are erroneous; that the average price of electrical power to the public, in large blocks, on the American side previous to 1914 was not less than $16 per horsepower; that the average price at the present time is $20 per horsepower; that the cost of producing hydro-electric power on the Niagara River, and the price for which the same can be furnshed to the public are in any event much less than on the DesPlaines or Illinois Rivers, and that so far as the question of hydro-electric power development is related to the withdrawal of water from Lake Michigan by the Sanitary District, the development and sale of power from that volume of water is much more

beneficial to the general public if developed on the Niagara and St. Lawrence Rivers, and means a very large economic saving.

Mr. Randolph, in his testimony, made no reference to the re-use of water on the St. Lawrence River and the amount of power capable of development at that point from the water withdrawn from Lake Michigan through the Sanitary Canal. 10,000 c. f. s. on that part of the St. Lawrence River forming the international boundary line is capable of developing approximately 100,000 horsepower at a cost which will permit its sale to the public, in large blocks, at about the same price as power developed at Niagara Falls on the American side.

The conditions at Niagara Falls are recognized and commented up by the Federal Power Commission in its First Annual Report, at pages 8-10. We quote the following from page 9:

> "The Niagara plants, among the first to be constructed in this country, developed only 10.6 horsepower per second-foot of water. Modern design will permit of 19 horsepower."

The improved development which has been made by the Niagara Falls Power Company actually develops over 20 horsepower per second-foot of water. This improved development is under a mean head of 215 feet. If the development were under the full head of upwards of 300 feet possible on the Niagara River between Niagara Falls and Lake Ontario, there would be obtainable 30 horsepower for each second-foot of water.

IV.

CONGRESS HAS NOT AUTHORIZED ANY ABSTRACTION OF THE WATERS OF LAKE MICHIGAN AS IS CLAIMED BY APPELLANT.

The Act of Congress of March 2, 1827, cannot be construed as authorizing any diversion or abstraction of waters from Lake Michigan.

Appellant, by a most interesting, if not convincing, argument attempts to connect its right to the abstraction of waters from Lake Michigan with the provisions of the Act of Congress of March 2, 1827. (Appellant's Brief, p. 115.)

The State of Illinois had in 1827 authority to construct canals. Congress, to aid the state to construct a canal to connect the waters of the Illinois River with those of Lake Michigan, made, under the said Act of 1827, a grant of lands, the revenue from the sale of which lands so granted could be used to aid in the contemplated canal construction. To take advantage of the grant, the construction of the canal was to be commenced within five years and completed within twenty years. The canal contemplated by this Act of 1827 was to be a navigable public highway for the transportation of persons and property, and such a one as would suit the needs of commerce. This is emphasized when we read the Amendment to this Act of March 2, 1827, made by the Act of March 2, 1833, (4 Statutes at Large, page 662), under the terms of which the lands granted under the Act of March 2, 1827, could be "used and disposed of by said state, for the purpose of making a railroad instead of a canal as in said act contemplated; and that the time for commencing and completing said canal or railroad, whichever the State of Illinois may choose to make, be and is extended five years:"

Illinois chose to build a canal instead of a railroad. The title of the Act of March 2, 1827, uses the words "connect the waters," while Section one of the act the words "unite the waters" are used. Neither "a connection" or "a uniting" of the waters contemplated, inferred nor authorized an abstraction or diversion or any of these waters. The canal actually constructed by the state, "had a summit of eight feet above Lake Michigan, and it was fed in ordinary seasons from the Des Plaines River and by a feeder through the Sag Valley and the Calumet River at Blue Island." (Rec., Vol. 3, p, 1716—Appellant's Narrative Statement, p. 269.)

That the state understood that the Act of March 2, 1827, did not contemplate any abstraction of the waters of Lake Michigan is best illustrated by the method in which the state acted under its authority to construct this canal.

That there can be no possible connection between the navigation canal authorized by the Act of March 2, 1827, and the Sanitary Canal built by the appellant is plain.

Since the adoption of its Constitution of 1870, the State of Illinois is without authority to loan its credit or make appropriations in aid of canals. The constitutional provision referred to reads as follows:

> "The Illinois and Michigan canal shall never be sold or leased until the specific proposition for the sale or lease thereof shall first have been submitted to a vote of the people of the State at a general election, and have been approved by a majority of all the votes polled at such election. The General Assembly shall never loan the credit of the State, or make appropriations from the treasury thereof, in aid of railroads or canals: Provided, that any surplus earnings of any canal may be appropriated for

its enlargement or extension." (Const. 1870, separate sec. 3; Starr & Cur. Stat. 1896, p. 206.)

In the case of

Burke v. *Snively*, 208 Ill. 328-348,

Mr. Justice Boggs, delivering the opinion of the court, in construing the above cited section of the Illinois Constitution of 1870, held that this section prohibited an appropriation by the legislature in aid of the Illinois and Michigan Canal, which is the canal constructed by the State of Illinois with the aid of the money derived from the sale of the lands granted to the State of Illinois under the provisions of the aforesaid Act of Congress of March 2, 1827. In his opinion, Justice Boggs said, among other things:

> "Though it does not aid to the determination of the question of the power of the legislature to make the appropriation in question, it is not inappropriate to remark that the fears entertained by members of the constitutional convention that more modern and more speedy means of transporting passengers and commodities would soon supplant the canal and divert traffic from it, and the canal would become practically of no use as a waterway or highway of traffic and commerce and would cease to produce an income sufficient to pay the expenses connected with its management, and would, unless restrained by the constitution, become a regular applicant at the door of the State treasury for appropriations of money of the tax-payers of the State, *have been verified*. In 1876 the tolls received for the use of the canal aggregated $113,293, but since that year there has been a marked and substantially gradual decrease in such receipts. In 1900 so little demand was there for the canal as a highway or waterway for transportation of persons or property that but $13,867 were paid as tolls. In 1901 the use of the canal for the purpose of trade or commerce was so little availed of that but $8120 were collected from tolls. The gross receipts were much larger in all

the years than the sums stated, but the excess arose from sales of ice privileges and sales of water power. But in addition to all receipts, of every character, during these years, heavy appropriations from the treasury of the State, amounting to something more than one-half a million dollars, have been asked and obtained from the public treasury to meet the deficiencies arising from the management and operation of the canal. The canal has practically fallen into disuse for any of the purposes of transportation of either persons or property, and has been perverted to mere commercial purposes of supplying water power to those along its banks and selling privileges to cut ice from its pools. It is no longer a highway of commerce." (The opinion was filed Feb. 17, 1904.)

The appellant was created as a "Sanitary District" under the provisions of the Act of Illinois of May 29, 1889, "An Act to create Sanitary Districts, etc." (Rec., Vol. 8, p. 90.)

It was said in *Chicago* v. *Green*, 238 Ill. 258, "The purpose of the Act of 1889 was to furnish a common outlet for the sewage of the incorporated municipalities within the limits of the district," and in *People* v. *Nelson*, 133 Ill. 565, "A Sanitary District is a municipal corporation organized to secure, preserve and promote the public health." Within the limits of the title and the body of the act under which appellant exists and operates, while navigation might be the result, it could not be the object of the construction of any drain or canal by this appellant. A sanitary canal built by the appellant may result in being used, in part, as a navigation canal, but the Sanitary District, the appellant, would have to justify the existence of any of its canals upon the ground that such canal was built solely to meet the needs of sanitation.

While the construction of a navigation canal was en-

tirely foreign to the act under which appellant derives its powers, nevertheless the record shows that more than $15,000,000 of the expenditures actually made upon the Chicago Drainage Canal by this appellant was distinctly for the benefit of navigation. (Rec., Vol. 3, pp. 1176-1177.)

Obviously there can be no connection between the navigation canal mentioned in the Act of Congress of March 2, 1827, and appellant's Sanitary Canal.

The Secretary of War Was Without Power to Authorize Any Abstraction of Such Waters.

The permit issued by the Secretary of War on the 8th day of May, 1899, was based upon the provisions of Section 10 of the Rivers and Harbors Act of March 3, 1899. This permit authorized the diversion of 300,000 cubic feet per minute of the waters of Chicago River so as to cause them to flow into the artificial channel constructed by the appellant. So far as we have searched the record we are unable to find any instance where the work of an abstraction of the waters of the Great Lakes, at least beyond 4,167 cubic second feet, has ever been recommended by the chief of engineers U. S. Army. It is apparent that in all proceedings before the Secretaries of War, that the Secretaries were persuaded by such reports as were given to them by the chief of engineers that the particular "work" of abstraction of Lake Michigan waters would be "an obstruction to the navigable capacity" of the Great Lakes. Secretary of War, Hon. Henry L. Stimson, emphasized this, when in denying the application of the appellant to abstract 10,000 cubic second feet, he said:

> "It is clear that even under the conditions heretofore manifested on these applications, the propo-

sition to divert the waters of Lake Michigan into another watershed has not been entertained without hesitation and careful restriction by my predecessors. The propriety of obtaining congressional sanction for the project has been pointed out from the beginning; and the form in which the permit has been granted, even for the moderate amount of diversion permitted, has been so phrased as to indicate that the permission was predicated upon the absence of any substantial injury to commerce. The sanitary canal has never received the direct sanction of Congress."

It also seems clear that the Secretaries of War construed the Rivers and Harbors Acts of 1890 and 1899 to mean and provide that the Secretary of War, under these acts, could not legally authorize any work of "altering or modifying the course, condition and capacity" of the Great Lakes, or other navigable waters of the United States when it was apparent that such work would obstruct the navigable capacity of the waters, unless and before Congress, by affirmative congressional action, authorized the particular work of obstruction. The conclusions reached by the Secretary of War upon denying the aforesaid application for the abstraction of 10,000 cubic second feet, indicate the construction placed upon the Rivers and Harbor Act of 1899. The conclusions are as follows:

"*First.* That the diversion of 10,000 cubic feet per second from Lake Michigan, as applied for in this petition, would substantially interfere with the navigable capacity of the navigable waters in the Great Lakes and their connecting rivers.

Second. That that being so, it would not be appropriate for me, without express congressional sanction, to permit such a diversion, however clearly demanded by the local interests of the sanitation of Chicago.

Third. That on the facts here presented no such case of local permanent necessity is made evident." (Rec., Vol. 8, page 58.)

It is also clear that at the time of the original authorization by the Secretary of War, May 8, 1899 (Rec., Vol. 8, pages 44-45), that the only contemplated "obstruction to the navigable capacity of the waters of the United States" was as to the waters of the Chicago River. As the exact effect upon the Great Lakes and connecting waters of abstracting a given amount of water therefrom could only be ascertained after prolonged observations (Appellant's Narrative Statement, page 514), it is evident that it was apparent at the time this permit for the abstraction of 4167 cubic second feet was given that an obstruction to the navigable capacity of the Great Lakes and connecting waters was not contemplated. The reduction in the amount authorized, made by Secretary of War, Hon. Elihu Root (April, 1901), was directed at obstructions to the navigability of the Chicago River. (Rec., Vol. 8, page 46.) So, too, were the official authorizations of the War Department secretaries, *until* the application of the Sanitary District for an increased abstraction of these waters was considered by Secretary of War, Hon. Henry L. Stimson, during the time from February 5, 1912, to January 8, 1913. (Rec., Vol. 8, pages 48, 49, 50.)

It seems clear, from an examination of the provisions of Sections 9 and 10 of the Rivers and Harbors Act of March 3, 1899 (U. S. Stat. at L., Vol. 30, page 1121), that affirmative congressional action must be taken with regard to any construction or work which will obstruct the navigable capacity of any of the waters of the United States, and for authorization to construct any bridge, dam, dike or causeway over or in any port * * * canal * * * or other navigable water of the United States, except when the bridge, etc., is across rivers and other waterways, the navigable portions of which lie

wholly within the limits of a single state and such structures are being erected under authority of the legislature of that state. Wharves, piers, etc., built under the provisions of Section 10 may be constructed if they do not obstruct the navigable capacity of any of the waters of the United States when the plans for such construction have been recommended by the chief of engineers and authorized by the Secretary of War. So, too, under the provisions of Section 10, the work of excavating, filling, altering or modifying the course, etc., of any port * * * canal * * * or the channel of any navigable water of the United States may be undertaken when recommended by the chief engineer and authorized by the Secretary of War, and the work so undertaken does not obstruct the navigable capacity of any of the waters of the United States.

A construction of the aforesaid Rivers and Harbors Act of Congress, of March 3, 1899, was made by the court in the case of

Hubbard v. *Fort*, 188 Fed. 992.

It was there said:

> "Upon the only ground of demurrer considered, the question is thus reduced: Is this authority from the Secretary of War plenary or merely permissive? So far as applicable to the present question, such section may be summarized thus: *First*, the creation of any obstruction to the navigable capacity of any waters of the United States is prohibited unless affirmatively authorized by Congress; *second*, it shall not be lawful to build any structure in a navigable river or water of the United States, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and, *third*, it shall not be lawful to excavate or fill the channel of any navigable water of the United States unless such work is recommended by said Secretary of War prior to beginning the same.

This section was construed in *Cobb* v. *Lincoln Park*, 202 Ill. 427, 67 N. E. 5, 63 L. R. A. 264, 95 Am. St. Rep. 258, and *Wilson* v. *Hudson County Water Co.*, 76 Atl. 560. In both of these it was held that the Secretary of War's authorization was a mere license to do the work and not a grant of power to do it. In the latter case V. C. Walker, adopting the view of the Illinois court, said: 'The doctrine of *Cobb* v. *Lincoln Park* as applicable to the case under consideration may be paraphrased as follows: The provisions of Section 10 of the Rivers and Harbors Act of March 3, 1899, were designed to protect the navigable waters of the United States from encroachment and from obstructions to navigation, and to commit the duty of their protection to an officer of the general "government without whose permission no such obstructions can be made; that the act is a mere regulation for the benefit of commerce and navigation, and that the license or permission of the Secretary of War is only a finding and declaration that a proposed structure or excavation would not interfere with or be detrimental to navigation, *and is not equivalent to a positive declaration by the authority of Congress that the licensee may make such obstruction or excavation without first obtaining the consent of the owner of the submerged land;* that the act is not a declaration touching the rights of the owner of the submerged lands in question, and, assuming that the permission of the general government to the excavation and laying of the proposed pipe line is necessary, such permission is not given to override the rights of the owner of the submerged lands, namely, the state of New Jersey, and it is, as said, the declaration by the guardian of the interests of the public at large that the proposed work will not interfere with navigation, and is strictly permissive, and not an authorization by paramount authority to do the work proposed. * * *

It is perfectly apparent that nowhere in the tenth section of the Rivers and Harbors Act of 1899 *is there any intention, expressed or implied, to grant to any person or corporation the right to lay a pipe line under navigable waters in lands belonging to a*

state or individual for the purpose of transporting any merchantable commodity whatever. The only intention discovered is, as already said, the authorization of such a work if it may be lawfully done, and the intention is to authorize it to be done only in such a way as to prevent its being any obstruction to navigation. * * *

In this connection, it may be observed that the tenth section of the Rivers and Harbors Act does not provide that it shall be lawful for the Secretary of War to authorize the excavation of land in the channel of any navigable waters of the United States, but only that it shall not be lawful to do the work without the authorization of the Secretary, before beginning the work. *The section as worded clearly contemplates that the consent of the Secretary shall merely be permissive of the doing of work for which authority already exists.*

In view of the context, the word 'affirmatively' was legitimately used to distinguish the two kinds of authority referred to, and to make it plain that the initial authorization to create an obstruction was not to rest on implied, but express—affirmative—congressional authority. * * *

Among the changes effected by the Act of 1899 was to require the affirmative authorization of Congress to create any obstruction to the navigable waters of the United States, except that bridges, dams, dikes, and causeways in or across the navigable portions of which lie wholly within the limits of a single state was permitted if authorized by state legislation and the location and plans of such structure were approved by the Chief of Engineers and of the Secretary of War." * * *

The provisions of the Rivers and Harbors Act of Sept. 19, 1890 (26 Stats. at L. 426), were before this Supreme Court for construction in the case of *U. S.* v. *Rio Grande Dam & I. Co.* (174 U. S. 706), wherein it was said:

"Whatever may be said in reference to obstructions existing at the time of the passage of the act, under the authority of state statutes, it is obvious that Congress meant that thereafter no state should

interfere with the navigability of a stream without the condition of national assent. It did not, of course, disturb any of the provisions of prior statutes in respect to the mere appropriation of water of non-navigable streams in disregard of the old common-law rule of continuous flow, and its only purpose, as is obvious, was to affirm that as to navigable waters nothing should be done to obstruct their navigability without the assent of the national government. * * *

The language is general, and must be given full scope. *It is not a prohibition of any obstruction to the navigation, but any obstruction* to the navigable capacity, and anything wherever done or however done, within the limits of the jurisdiction of the United States which tends to destroy the navigable capacity of one of the navigable waters of the United States, is within the terms of the prohibition. *Evidently Congress, perceiving that the time had come when the growing interests of commerce required that the navigable waters of the United States should be subjected to the direct control of the national government, and that nothing should be done by any state tending to destroy that navigability without the explicit assent of the national government, enacted the statute in question.*"

V.

CONGRESSIONAL AUTHORITY FOR ABSTRACTION OF WATERS OF LAKE MICHIGAN MUST BE BASED SOLELY UPON COMMERCIAL IMPROVEMENT OF THE WATERS OF LAKE MICHIGAN OR IMPROVEMENT OF COMMERCE.

Report of a special board of engineers, which is signed by General W. H. Bixby, chief of engineers, U. S. Army, dated January 23, 1911, pages 8-9, says:

"For purposes of navigation, a diversion from Lake Michigan of less than 1,000 second feet of water is all that will be necessary. For purposes of sanitation the works of the Sanitary District of Chicago were designed to allow the diversion of 10,000

second feet and now contemplate a total of 14,000 second feet, the additional 4,000 second feet to be obtained by a diversion of water through the Calumet River and a connecting canal following the Sag route. The War Department, while awaiting the definite action of Congress, has so far permitted the diversion of 4,167 second feet, and the Sanitary District is understood to be using 7,000 second feet. As the water which is at present being diverted from the lake appears to have already seriously affected the navigation of its harbors and connecting waterways, prompt congressional action is recommended to limit the diversion." (Rec., Vol. 6, p. 3633-3634.)

The report referred to in the above is included in the record, in Volumn 4, pages 2397-D and 2397-E, but the references in the report to the foregoing quotation is not included in the transcript of the record.

"The right of the United States in the navigable waters within the several States is limited to the control thereof for the purposes of navigation. Subject to that right Washington became upon its organization as a State the owners of the navigable waters within its boundaries."

Port of Seattle v. *Oregon & Washington Ry. Co.*, 255 U. S. 56.

The right in and to the navigable waters belonging to the states surrendered by the states to the general government was that right given to the general government under the provisions of Subsection 3 of Section 8, Article 1, of the Constitution of the United States, under the terms of which:

"the Congress shall have power * * * to regulate commerce with foreign nations and among the several states."

"The jurisdiction of the general government over interstate commerce and its natural highways, vest in that government the right to take all needed measures to *preserve the navigability of the navigable water courses of the country, even against any*

state action, and nothing should be done by any state tending to destroy such navigability without explicit assent of the National Government."

United States v. *Rio Grande Dam & I. Co.,* 174 U. S. 690.

In regard to these waters, as highways upon which the commerce of the states and nations move, Congress is given a power to control their use in the interest of that commerce. This authority is given to Congress for the purpose of aiding, and not destroying, navigation and commerce, so that, although the authority over navigable waters is absolute in execution of the trust imposed in it, whatever obstructions Congress authorizes must be for the purpose of improving the navigation of the streams, or of facilitating commerce.

Farnham on Waters, Vol. 1, page 60.

See,

Depew & Wabash and E. Canal, 5 Ind., p. 8.

If the federal government was undertaking the construction of a canal connecting the Great Lakes with the Illinois River, the government would have to base its authority for such action upon the exercise of its power to regulate commerce. The Government could not undertake the work of providing a water course for washing away sewage of a municipal corporation of the State of Illinois.

Obviously, that which Congress itself could not do, the Secretary of War could not do under any claimed congressional authorization or assumed delegation of congressional power.

The states, therefore, respectfully submit, that, in view of the fact that the abstraction of any of the waters of the Great Lakes would tend to affect and obstruct the navigation thereon, no more waters thereof should, or could, be used by the Government than was necessary in the general improvement of commerce, and that the

use of the Sanitary District of these waters, in excess of the amount of waters necessary to provide a commercial highway; which clearly seems to be an amount of less than 1,000 cubic second feet, must be considered as an obstruction of navigation and a hindrance to commerce.

All of which is respectfully submitted.

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No. 161.

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1924.

THE SANITARY DISTRICT OF CHICAGO,
Appellant,
vs.
THE UNITED STATES OF AMERICA,
Appellee.

BRIEF OF THE CITY OF CHICAGO, APPEARING AS AMICUS CURIAE.

Mr. FRANCIS X. BUSCH,
Corporation Counsel of the City of Chicago,
Mr. LEON HORNSTEIN,
Assistant Corporation Counsel,
Solicitors for the City of Chicago.

BARNARD & MILLER PRINT, CHICAGO

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1924.

No. 29839.

THE SANITARY DISTRICT OF CHICAGO,
Appellant,
vs.
THE UNITED STATES OF AMERICA,
Appellee.

BRIEF OF THE CITY OF CHICAGO, APPEARING AS AMICUS CURIAE.

MAY IT PLEASE THE COURT:

This case has pursued its way through many years of litigation without taking into account the interests of the City of Chicago as a municipality. The people of the city, along with the people of the numerous other towns, villages and cities of the Sanitary District of Chicago, have had their interests presented by the attorneys for the District. But as a municipal corporation the City of Chicago has not even had the benefit of sharing representation with the many other municipal and quasi-municipal corporations whose property interests are affected by this litigation.

When it is considered that there are a large number of these corporations, so large a number in fact that the list of villages, towns and cities on pages 4 and 5 of the Petition of the City of Chicago contains only a portion of them, it becomes apparent at once that even if an

attempt had been made to present the property interests of these municipalities, the very important interests of the City of Chicago could not have been adequately handled merely as a unit in a list of municipalities aggregating considerably more than fifty and perhaps numbering one hundred. The property interests of all of these outside of the City of Chicago are comparatively small, and arguments could be used against them which would not apply in the case of the large city. To be sure, the necessity for pure water exists in the small community as well as in the large community, and the principle involved in being deprived of a hearing is the same in both cases, but otherwise the matter presents itself in an entirely different aspect when a city of great size seeks to adjust itself to conditions which may be readily overcome by a corporation of small size. Since neither the City of Chicago nor any of these other corporations have had a hearing, however, it is idle to discuss what kind of presentation should have been made for this city as distinguished from the others.

The City of Chicago had a waterworks system and an enormous investment of capital therein long before The Sanitary District of Chicago was created. The creation of this District did not take this plant away from the City. It retained this property and made such immense additions thereto that the enormous investment we speak of becomes small by comparison. All these investments, the original investment and the additions, have been put into a water plant built so that the whole system adapts itself to the conditions that exist which The Sanitary District is striving to maintain in this suit. The plant belongs to the City of Chicago in its corporate capacity. At least half of this tremendous plant would be rendered useless or nearly so if the decree entered in the court below were to stand, while the corporation which owns it

has not had its day in court. This would amount to a deprivation of property without due process of law on a scale that is staggering.

To anyone who is not familiar with the situation, the holding of this property and its management by one municipal corporation and the control and responsibility for the supply of water to the plant by another municipal corporation seems an anomalous condition. It has been explained to a certain extent, but not entirely, in the briefs presented in this case. We will attempt a further elucidation, confining ourselves to those points which we think have not been fully explained.

Like all rapidly growing communities, the City of Chicago, from the time of its incorporation, was confronted by a debt limitation. Likewise, as is the case with most growing communities, it was confronted with the danger of pollution of its water supply.

The debt limitation fixed by the Constitution of the State of Illinois was five per cent of the total value of the property of the City as ascertained for purposes of taxation at the last preceding assessment. Section 12 of Article IX of the said Constitution reads as follows:

> "Section 12. No county, city, township, school district, or other municipal corporation, shall be allowed to become indebted in any manner or for any purpose, to an amount, including existing indebtedness, in the aggregate exceeding five per centum on the value of the taxable property therein, to be ascertained by the last assessment for State and county taxes, previous to the incurring of such indebtedness. Any county, city, school district, or other municipal corporation incurring any indebtedness as aforesaid, shall before, or at the time of doing so, provide for the collection of a direct annual tax sufficient to pay the interest on such debt as it falls due, and also to pay and discharge the principal thereof within twenty years from the time of contracting the same. This section shall not be

construed to prevent any county, city, township, school district, or other municipal corporation, from issuing their bonds in compliance with any vote of the people which may have been had prior to the adoption of this Constitution in pursuance of any law providing therefor."

When it became certain that the supply of water was contaminated and would ultimately be so polluted that the danger to health would be great, the City undertook to find means to overcome this. The manner in which the danger was avoided by the construction of the canal was fully described in the record and is told in the brief of appellant. But there is one reason for the creation of The Sanitary District of Chicago that has been very lightly touched upon. That is the fact that the City of Chicago was prevented by its debt limitation from itself undertaking the construction of a sanitary canal, and that its people had to resort to the subterfuge of creating a new municipal corporation superimposed on its territory in order to get around this limitation. It was the only way in which it was possible to finance an improvement which would obviously cost a great deal of money, and which in fact has cost a sum approaching a hundred million dollars.

This was one of the principal reasons why The Sanitary District of Chicago was created. The function of digging supply tunnels, building intakes and pumping and supplying water was not turned over to the Sanitary District. It performed and is now performing the function of purifying the water supply. All the rest of the work of supplying water to the City, to its inhabitants, to other municipalities within the district, and to their inhabitants, continues to be the function of the City of Chicago, which has many other functions to perform, requiring revenue.

Necessarily the plant comprising the water system of so great a city would have been costly under any circumstances. But it was rendered more costly by reason of certain provisions of the Sanitary District Act which imposed additional obligations and expense on the City of Chicago.

Section 26 of this Act reads as follows:

"Section 26. Whenever in any such sanitary district there shall be a city, incorporated town or village which owns a system of water-works and supplies water from a lake or other source which will be saved and preserved from sewage pollution by the construction of the main channel, drain, ditch or outlet herein provided for, and the turning of the sewage of such city and district therein, and there shall be in such sanitary district any territory bordering on any such city, incorporated town or village, within the limits of another city, incorporated town or village, which does not own any system of water-works at the time of the creation of such sanitary district, then upon application by the corporate authorities of such latter named city, incorporated town or village, the corporate authorities of such city, incorporated town or village, having such system of water-works shall furnish water at the boundary line between such municipalities by means of its water works to the corporate authorities asking for the same in such quantities as may be required to supply consumers within said territory, at no greater price or charge than it charges and collects of consumers within its limits for water furnished through meters in like large quantities:

Provided, however, that where any such latter named city, incorporated town or village has no territory bordering upon such city, incorporated town or village so owning a system of water-works and supplying water as aforesaid, such latter named city, incorporated town or village may receive water in the same manner and under the same conditions as though it had territory bordering upon such municipality owning a system of water-works and supplying water as aforesaid; *provided,* such latter named

city, incorporated town or village builds or causes to be built suitable and sufficient water mains to the limits of such city, incorporated town or village so owning a system of water-works and supplying water as aforesaid to connect with the water mains and receive the water from such city, incorporated town or village so owning a system of water-works and supplying water as aforesaid."

The above provision requires the City of Chicago to serve, in addition to its own population of 3,000,000, communities surrounding it having a population of 300,000. This would entail in the first instance a plant enlarged ten percent above the needs of the City, but obviously of much greater capacity, since the tendency towards a proportionately larger population beyond its borders grows greater as its business area expands.

Consequently, the City of Chicago has on its hands a costly plant, immensely valuable at present, a large part of which would be rendered useless if deprived of an unpolluted supply of water, and the balance serviceable only in cast it constructs an enormously expensive filtration plant. In addition to this it would have constructed a portion of a plant of no value whatever because it was constructed for outside communities that would have to be cut off and compelled to find their own pure water supply. The alternative to this latter proposition is the building of a filtration plant designed to furnish pure water beyond its borders as well as to its own inhabitants.

With such tremendous interests at stake, can it be said that the City of Chicago has had its day in court? Much has been said about the great cost of the sanitary and ship canal of the appellant, and it is shown that its cost was somewhere near $100,000,000, and that the loss to the people of Chicago and the surrounding communities would be enormous.

Nothing has been said about the cost of the water distributing plant of the City of Chicago, however, which may easily have cost two or three times as much, and the total loss to the people of this district may run into figures comparable to those for financing a great war.

Adding together the cost of the canal, the cost of the City's water system, the cost of the water systems of other municipalities in the district, and estimating the total loss, there is no doubt that the Court has not been fully advised regarding these tremendous property interests. Nor can it fully understand the insignificance, as compared to such interests, of other interests that conflict therewith from the standpoint of navigability of waters. There is no method by which the court can arrive at a just comprehension of the situation in the present state of the record.

It is true, of course, that the necessity for pure water is the paramount need of the people of Chicago and deserves the first consideration. If there was opposed to this the possibility of contamination of water supplies of other communities and danger to the health of people in other places, there might be some reason for saying that the interests of the people of the City of Chicago cannot be so taken care of that other interests must suffer. But that is not the case.

The use of this water by the City of Chicago and surrounding territory does not operate to deprive other communities of pure water or to endanger the health of people elsewhere. It is not pretended that the suit has anything to do with the preservation of health in other districts and communities besides those in or near The Sanitary District of Chicago. The only things that are solicitously to be looked after are the navigation interests of cities and towns located on the great lakes.

When a comparison is made between the property interests of the City of Chicago that are placed in jeopardy by the decree in this case and the interests of the lake towns and cities that would theoretically be damaged in the lessened navigability of their harbors, the balance of convenience is so largely on the side of Chicago that the comparison becomes ludicrous. It is like a pop gun beside a cannon.

We are not disposed to concede that it has been established by the evidence that the lake level would be lowered by the withdrawal of 10,000 cubic feet of water per second. We believe that it would take twenty years of careful measurement and sounding to make any thing like a safe estimate or prediction on this point. The water rises and falls over a period of years under no known or fixed rule. It may vary one way or another and seemingly confirm conclusions drawn from observations made for three or four years, and then without apparent cause (or at least without cause that can be ascertained immediately) shift the other way.

Under these conditions it becomes more especially and peculiarly within the province of the court to take into consideration the balance of convenience of which we speak. The City of Chicago could afford to make good many times over the loss sustained by any and all Federal, State and municipal agencies that have to do with navigation on the Great Lakes (if any) and still be very much better off with the right to withdraw 10,000 cubic seconds feet of water, Add to this the fact that no such loss or damage has been established, and it at once becomes plain that there is the greatest danger of doing injustice beyond measure to one municipality and its people where no real or substantial good can be accomplished for any other.

Turning now to the possibility of helping itself out of its unhappy predicament if the flow of water should be reduced as proposed, what chance has the present generation for a pure water supply? It is not to be conceived that this court would sanction any program or enter any decree which would result in the possible raising of the typhoid rate to even the lowest that obtained prior to the opening of the canal. That was 27 deaths per year for each 100,000 inhabitants. It is now one for each 100,000 inhabitants. Therefore, such an increase among 3,300,000 people would amount to 858 additional deaths per year.

It might be said that this sort of figuring is merely conjectural—that the means of fighting typhoid have improved, and that there is no danger of such a result. Be that as it may, the fact remains that there will be an increased death rate under such conditions. The rich will find means of circumventing it by the purchase of spring water (although even that is often impossible and subject to fraud on the part of the purveyor), but the poor will drink the contaminated water and suffer for it.

The only possible solution at present is a filtration plant. Large areas of land would have to be cleared near the shores of Lake Michigan, great reservoirs would have to be constructed, and other things would have to be done, involving an outlay of approximately $100,000,000. The present generation would have neither the means to finance nor the time to build such a plant.

The land would have to be secured either by converting the City's beautiful lake front parks into reservoirs for purposes of purification, or land of great value would have to be condemned to secure the necessary area.

There is no other way of supplying the needs of the people of Chicago and the surrounding territory except

from the waters of Lake Michigan. The water at the present time is supplied for drinking purposes and for domestic purposes from the same pipes as carry water for manufacturing plants and other uses. There never was any occasion for dividing the supply. The division could not be made now. Hence, the filtration of all the water pumped, amounting to over 800,000,000 gallons per day, would be necessary.

The financing of such a filtration plant by any of the ordinary methods which a municipality can legitimately employ is out of the question. We have already shown that it was necessary to create a new municipal corporation in order to make possible the construction of the canal. It would be necessary to create another municipal corporation to raise such an amount of money as would be required for a filtration plant. The mere statement of such an idea is sufficient to provoke a smile. It took thirty years of agitation to create The Sanitary District of Chicago. It would take longer to create another municipal corporation for the sole purpose of building a filtration plant.

The ordinary methods for financing such an improvement are either by issuing bonds or by direct taxation. To this may be added, in this case, the collection of water rates.

The impossibility of floating bonds for this purpose is manifest when the constitutional limitation already quoted is taken into account. As was stated in the Petition of the City of Chicago, heretofore filed herein, the debt limitation under the Constitution is now $89,433,-268.95. There have already been authorized bonds to such an extent that, with other indebtedness that must be figured, the total debt would be $89,891,700 if all authorized bonds were issued. That is the comptroller's estimate as of November 20, 1924.

All water certificates and bonds or certificates for a filtration plant would have to be included in the limitation. (See *Stone* v. *City of Chicago*, 207 Ill. 492; *Lobdell* v. *City of Chicago*, 227 Ill. 218.) Hence, if all other improvements were allowed to remain at a stand-still and no new public improvements were undertaken, the possibility of issuing the necessary bonds would be so remote as to be unthinkable.

It might occur to someone to say in reply to this argument that the debt limitation of five per cent in the Constitution is not such a thing as need stand in the way of the people of a great state forever—that if it was a matter of life and death for three millions of its people a change could be made in this provision of the Constitution. In truth, however, the obstacle is insuperable. It is extremely difficult to amend the Constitution of Illinois when there is no objection to the proposed amendment. When there is opposition of a substantial nature it is impossible. The provision for amendment (Art. XIV, Sec. 2) is as follows:

> "Section 2. Amendments to this Constitution may be proposed in either House of the General Assembly, and if the same shall be voted for by two-thirds of all the members elected to each of the two Houses, such proposed amendments, together with the yeas and nays of each House thereon, shall be entered in full on their respective journals; and said amendments shall be submitted to the electors of this State for adoption or rejection, at the next election of members of the General Assembly, in such manner as may be prescribed by law. The proposed amendments shall be published in full at least three months preceding the election, and if a majority of the electors voting at said election shall vote for the proposed amendments, they shall become a part of this Constitution. But the General Assembly shall have no power to propose amendments to more than one article of this Constitution at the same session, nor to the same article oftener than once in four years."

Even so salutory an amendment as the one just voted upon, whereby the number of amendments that could be proposed at one time was raised to two, which was known as the "Gateway Amendment," and against which there appeared no pronounced opposition, seems to be defeated. The same thing happened to the revenue amendment offered several years ago, which was the last preceding amendment and was apparently acceptable as a means for making needed revenue changes. When it is considered that there would be pronounced opposition to any amendment of the Constitution which would call for largely increased taxation, or which affects The Sanitary District of Chicago in any way, whether adversely to the interests of the people "down-state" or not, the utter hopelessness of turning to this supposed means of relief is manifest.

Hence, there is no chance whatever of raising the necessary revenue either by means of a bond issue or by any subterfuge for evading the established debt limitation.

So far as raising the necessary money for an improvement of such magnitude by direct taxation is concerned, that is also out of the question. A comparison between the rates of taxation, whether taken on a *per capita* basis or on a property basis, or by any other means, would show the rate of taxation in Chicago for local purposes at least up to the average. The Department of Commerce issues statistics of the Bureau of the Census which clearly demonstrate this, although it is extremely difficult to make a comparison which is even approximately correct. (See Table 14, pp. 266 to 307, Financial Statistics of Cities Having a Population of Over 30,000; Published by Department of Commerce in 1924.)

Since it must be conceded that there is necessity for local expenses which will take up such average tax rate,

there is no occasion for reciting at length the financial worries of the City of Chicago as a municipality. It has these to quite as full an extent as other municipalities. They would effectually prevent the diversion of any considerable sum out of the annual revenues from the fund for general corporate purposes to the water fund.

Finally there remains the possibility of raising water rates sufficiently to finance such an improvement as the installation of a filtration plant. While this may be conceded to be the most promising of the methods suggested, it has its limitations. The appropriations for the current year for the Bureau of Water are less than $15,000,000. (See Journal of the Proceedings of the City Council of the City of Chicago, March 28, 1924, page 2365.) The income from water rates at present is far below this, the system showing a loss of considerable size from year to year.

To raise water rates sufficiently to take care of present deficiencies and at the same time build a filtration plant would mean such an increase as would at least double the rates—perhaps treble them. The taking on of such a burden would be equivalent to an increase in the taxation, and in any event it would amount to a great loss to the owners of property in the City.

Another feature of the situation with respect to the installation of a filtration plant must not be lost sight of. That is the time it would take to prepare and to build such a plant. This has been estimated as twenty years. It may be conceded that this subject is more or less problematical, but that a large amount of time would be necessary is certain.

Water now comes through tunnels extending underneath the lake for distances of from two to four miles. Whether these would be rendered useless or whether they can be

so converted that they will form parts of the proposed filtration plant belongs to those engineering problems which we are not called upon to go into. But whatever is done with them, the cost manifestly would be great, and the time necessary to convert them would be a matter of many years. On the other hand, if the court should decide to affirm the decree, it would depend entirely on the indulgence of the court whether it would go into effect immediately or not.

In this connection it might be well to consider that the entry and the enforcement of the decree in the court below have been put off for a number of years, and the danger of which complaint is made in the bill does not seem to have become greater or more imminent.

In presenting the view of the situation which this brief sets forth we have to some slight extent traveled beyond the record, although we have, in such matters as do not appear in the record, endeavored to confine ourselves to things that are matters of common knowledge.

The principal contention that we make, having in mind that arguments on both the sanitary and ship canal features of the controversy have been presented by others, is that the decree, if affirmed, would be the means of wiping out large property values of the City of Chicago, that this would be done without a hearing and without taking testimony concerning the comparative value of the property rights affected. We are late in presenting this phase of the controversy, but on the whole we believe it is better to present it now and in this case than to wait until this case is ended and then attempt to set up our rights in an independent proceeding.

While we have stressed the property interests of the City of Chicago in this brief, lest it be understood as

trying to give greater prominence to these than to the health and sanitary features of the case, we repeat that the question of the health of the people is of much greater importance than anything else in the case. To turn back the foul waters which the people of this district have been at such pains to divert would create havoc in the community. It would mean the destruction of a record of constant improvement in the matter of public health that has been unbroken for 30 years. It would turn back the wheels of progress and open the floodgates of disease upon an unprotected public. The consequences would be appalling if a single typhoid epidemic were to result, and with the sewage returning to the lake it would be impossible to avoid that.

We join with the appellant in praying for a reversal of the decree, in order that when the case is reopened the City of Chicago may have an opportunity to intervene and present the phase of the case we have outlined above.

Respectfully submitted,

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.....

Corporation Counsel of the City of Chicago.

Leon Hornstein

.....

Assistant Corporation Counsel of the City of Chicago.
Solicitors for the City of Chicago.

(8)

IN THE

Supreme Court of the United States.

OCTOBER TERM, A. D. 1925.

No. 161

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

UNITED STATES OF AMERICA,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

PETITION FOR REHEARING ON BEHALF OF AMICI CURIAE ALLOWED BY ORDER OF COURT TO APPEAR AND OPPOSE THE AFFIRMANCE BY THIS COURT OF THE DECREE BELOW.

GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

IN THE

Supreme Court of the United States.

OCTOBER TERM, A. D. 1925.

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

UNITED STATES OF AMERICA,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

PETITION FOR REHEARING ON BEHALF OF AMICI CURIAE ALLOWED BY ORDER OF COURT TO APPEAR AND OPPOSE THE AFFIRMANCE BY THIS COURT OF THE DECREE BELOW.

Now come the states of Illinois, Missouri, Louisiana, and Tennessee and the Chamber of Commerce of St. Louis, Memphis Chamber of Commerce, New Orleans Board of Trade, New Orleans Association of Commerce, Mississippi Valley Association, and the Chicago Association, as *amici curiae* appearing by leave of court first had and obtained, and respectfully petition this Honorable Court to vacate the order of affirmance en-

tered herein on the 5th day of January, A. D. 1925, and to grant a rehearing in the above entitled cause.

In support of this petition for rehearing the above mentioned *amici curiae* submit suggestions hereto attached and made a part hereof.

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JESSE W. BARRETT,
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DANIEL N. KIRBY,
Of Counsel.

IN THE

Supreme Court of the United States.

OCTOBER TERM, A. D. 1925.

THE SANITARY DISTRICT OF CHICAGO,
Appellant,

vs.

UNITED STATES OF AMERICA,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

SUGGESTIONS IN SUPPORT OF THE FOREGOING PETITION FOR REHEARING.

In order that we may present the points relied upon to justify this application as concisely as possible, we must first outline briefly the opinion of the court.

The opinion begins by describing the bill. It states that obstructions to navigation in violation of Section 10 of the Act of March 3, 1899, are specifically pleaded, but says:

> "The form of the bill does not preclude a reliance upon more general principles if they were needed in order to maintain it."

The works of the appellant were then described, and the answer is summarized.

The discussion of the law begins by resting the jurisdiction upon the sovereign power of the United States

to regulate commerce and control navigable waters. It is stated that the Attorney General, by virtue of his office, might bring this proceeding without statutory authority.

The court then lays down the rule that the power of the United States is superior to that of the states, and in matters where the national importance is imminent and direct, even when Congress has been silent, the states must not act at all.

The court then takes up the defense urged by appellant that the United States had given its assent to appellant's acts, and construes the Act of March 2, 1827, so much referred to in the argument. The court then quotes the material portions of Section 10 of the Act of March 3, 1899, and states:

> "This statute repeatedly has been held to be constitutional in respect of the power given to the Secretary of War. *Louisville Bridge Co.* v. *U. S.*, 242 U. S., 409, 424; 61 L. ed. 395, 403; 37 Sup. Ct. Rep. 158."

The court says this statute is a broad expression of public policy forbidding obstructions to navigable capacity, "not authorized by law," referring we assume, in the last phrase, to the power given the Secretary of War to issue permits for such alterations of navigable capacity.

The court says:

> "There is neither reason nor opportunity for a construction that would not cover the present case."

The court concludes its analysis of the question with the following expression:

> "This withdrawal is prohibited by Congress, except so far as it may be authorized by the Secretary of War."

The court then enters into a detailed discussion of

the several permits issued, and finds that no defense can be founded upon these permits. Referring to these *amici curiae*, the court says:

> "States bordering on the Mississippi allowed to file briefs as *amici curiae*, suggest that they were not heard, and that rights have not been represented before the Secretary of War. * * * The interest that the river states have in increasing the artificial flow from Lake Michigan is not a right, but merely a consideration that they may address to Congress, if they see fit, to induce a modification of the law that now forbids that increase unless approved as prescribed. * * * It is doubtful, at least, whether the Secretary was authorized to consider the remote interests of the Mississippi states or the sanitary needs of Chicago. All interests seem in fact to have been copiously represented, but he certainly was not bound to give them a hearing on the application upon which he was requested to pass."

The court then reviews the history of the litigation and the delay in reaching a decision, and concludes by affirming the injunction below.

I.

IN HOLDING THAT THE STATES DO NOT HAVE AUTHORITY TO AUTHORIZE DIVERSIONS FROM NAVIGABLE WATERS IN THE ABSENCE OF CONGRESSIONAL ACTION, IN THE FIRST PLACE, NO SUCH ISSUE IS TENDERED BY THE BILL OF COMPLAINT, AND IN THE SECOND PLACE, THE CONCLUSION OF THE COURT, OBITER WE SUBMIT, IS CONTRARY TO A LONG LINE OF PRIOR DECISIONS BY THIS COURT.

(a) We assume that this court applies the fundamental rule of equity that relief is limited to the allegations of the bill and does not go beyond the scope of the prayer. The bill of complaint in this case is founded solely upon the allegation that appellant failed to ob-

tain a permit in accordance with the requirements of Section 10 of the Act of March 3, 1899, authorizing diversions in excess of 250,000 c. f. a minute. The prayer of the bill (Vol. 8, Trans. of Rec., 44) prays for an injunction enjoining appellant from diverting waters in excess of 250,000 c. f. per minute as already authorized by the Secretary of War, and this was the injunction issued by the court below.

A fair consideration of the bill will demonstrate that there are no allegations alleging that the Attorney General is proceeding for the purpose of enforcing the sovereign power of the United States in a matter over which, even in the absence of Congressional action, the states can have no jurisdiction, by reason of any alleged exclusive effect of the Commerce Clause of the Constitution. The language of the opinion, therefore, in reference to this is clearly a misconstruction of the record. The case of the Government must stand or fall upon the validity and effect of Section 10 of the Act of March 3, 1899.

(b) Without referring to the authorities, this court has construed the Commerce Clause of the Constitution in many matters in such a way as to leave to the state concurrent jurisdiction over much of the realm of interstate commerce, which jurisdiction may be lawfully exercised until Congress has taken possession of the field by apt legislation.

This court has said as to a few matters, that they are such as to be within the exclusive jurisdiction of Congress because by their nature they require a uniform system or plan of regulation.

The opinion in this case does not claim any such basis for its conclusion that diversions from navigable streams require only one plan of regulation applicable to all

parts of the United States, and to all attempted diversions of water, whether for purposes of aiding mining, irrigation, reclamation projects, drainage of swamps, or as in the instant case, the improvement of waterways, and the incidental facilitation of sanitary projects. It is clear that in the nature of the subject matter, one uniform system of regulation would not operate for the public benefit.

In the *Rio Grande Dam Case,* 174 U. S. 690, this court dealt with diversions from navigable waters on the theory that these were within the concurrent jurisdiction of the states.

The following cases reflect this view: *County of Mobile* v. *Kimball,* 102 U. S. 691; *Lindsay* v. *Phillips,* 176 U. S. 126; also: *U. S.* v. *Crest,* 243 U. S. 316, and the *Bellingham Bay Boom Case,* 176 U. S. 223. Perhaps the leading authority on this subject is the case of *Cooley* v. *Board of Wardens,* 12 Howard, 289.

We respectfully submit that this court has, therefore, laid down a rule inconsistent with a long line of prior decisions.

II.

IN CONCLUDING AS THE COURT DOES THAT SECTION 10 OF THE ACT OF MARCH 3, 1899, IS CONSTITUTIONAL, THE COURT CITES AN AUTHORITY WHICH DOES NOT SUSTAIN ITS CONCLUSION IN ANY WAY WHATSOEVER, AND OVERLOOKS THE FACT THAT ON SETTLED PRINCIPLES OF CONSTITUTIONAL LAW WHICH ARE NOT CONSIDERED BY THE COURT IN ANY DECREE WHATSOEVER IN THIS DECISION, THE POWERS EXERCISED BY THE SECRETARY OF WAR IN THE INSTANT CASE ARE UNCONSTITUTIONALLY DELEGATED, IF THIS SECTION BE CONSTRUED TO CONFER SUCH AUTHORITY.

The court says in the opinion:

> "This statute has repeatedly been held to be constitutional in respect of the power given to the Secretary of War. *Louisville Bridge Co.* v. *United States,* 242 U. S. 409, 424; 61 L. ed. 395, 403; 37 Sup. Ct. Rep. 158."

Immediately prior to this sentence the court quotes the applicable portions of Section 10 of the Act of March 3, 1899. The *Louisville Bridge case,* cited to support this conclusion, does not concern itself in any degree whatsoever with Section 10, but did involve the exercise by the Secretary of War of the power conferred upon him by Section 18 of the Act of March 3, 1899, to regulate bridges, which unreasonably obstruct navigation. There is no other case which we have been able to find which squarely holds that the power conferred by Section 10 of the Act of 1899 is a constitutional grant of authority, and none is cited in the opinion except the erroneous citation just pointed out.

In a number of cases the court has had occasion to construe and pass upon the authority of the Secretary

of War under Section 18 of the Act of 1899, particularly *Union Bridge Co.* v. *United States,* 204 U. S. 364, and *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177. The court summarizes the state of the law in the latter decision, particularly as to the extent to which Congress could delegate its authority to the Secretary of War, and the manner in which such delegation must be constitutionally exercised, in the following expressions:

> "This Court has heretofore held, upon consideration and after an examination of the adjudged cases:
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> (1) That 18th Section of the river and harbor Act of March 3, 1899, 30 Statutes 1151, could not reasonably be taken as a delegation of legislative and judicial power to an executive department of the government; that the statute did not in any real, constitutional sense delegate to the Secretary of War any power that must, under our system of government, be exclusively exercised either by the legislative or judicial branch of the government; that under its paramount power to regulate commerce on and over the navigable waters of the United States, Congress could require that such waters be free from unreasonable obstructions to navigation; that the statute in effect prescribed the general rule, applicable to all navigable waters, that free navigation should not be hampered by unreasonable obstructions arising from bridges of insufficient height, width of span or other defects; that instead of exerting its power by direct legislation in each case of a bridge alleged to constitute an unreasonable obstruction to navigation, Congress charged the Secretary of War with the duty of ascertaining, in each case, upon notice to the parties concerned, whether the particular bridge came within the general rule prescribed; * * *
>
> (2) That the Act of 1899 did not invest the Secretary of War with arbitrary power in the premises, since in reference to any bridge alleged to constitute an unreasonable obstruction to navigation, he was bound, before making any decision or tak-

> ing final action, to notify the parties interested of any proposed investigation by him, give them an opportunity to be heard, and allow a reasonable time to make such alterations as he found to be necessary to free navigation."

SECTION 10 in its construction and effect is entirely different. It lays down a broad prohibition of any obstruction of the navigable capacity of any waters of the United States, "not affirmatively authorized by Congress." And then provides that it shall not be lawful to do certain varieties of obstructions, nor to alter the capacity of any navigable water, "unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

Each of the acts mentioned in the concluding portion of the section which may be so authorized by the Secretary of War and Chief of Engineers, would, clearly, without such authorization, fall within the purview of the general prohibition in the first sentence of the statute. There is no test nor rule of any kind whatsoever specified in the statute by which the administrative officers are to be guided in determining whether or not their authority shall be granted. None of the requirements of due process providing for a hearing or notice to interested parties are found in this section. The language just quoted from the prior decisions of the court indicate clearly, we submit, that the exercise of authority conferred by Section 18 was held in these cases to be constitutional, simply and solely because the requirements of due process were, by the language of Section 18, carefully safeguarded and preserved. Based on the reasoning of these decisions Section 10 must be construed to be unconstitutional and void. This point was fully presented to the court in the brief filed

on behalf of *amici curiae,* pages 45 to 57, inclusive. It was only touched upon in the argument, due to the way in which the case was presented. Yet, nevertheless this court must assume that its decision will serve as authority for the granting by Congress of broad, unlimited and practically arbitrary power to administrative officers, a conclusion, not in the public interest, inconsistent with all prior decisions, and, we believe, not intended by the court in this case.

That the writer of the opinion of the court was unconsciously concerned with the requirements of due process as embodied in the exercise of the power conferred upon the Secretary of War by Section 10 of the Act of 1899 is clearly illustrated by the expressions in the opinion concerning the intervention of these *amici curiae.*

The court said:

> "States bordering on the Mississippi, allowed to file briefs as *amici curiae* suggests that they were not heard and that rights have not been represented before the Secretary of War. * * * It is doubtful, at least, whether the Secretary was authorized to consider the remote interests of the Mississippi States or the sanitary needs of Chicago. All interests seem in fact to have been copiously represented, but he certainly was not bound to give them a hearing upon the application upon which he was requested to pass."

In stating that these *amici curiae* were represented before the Secretary of War, the court has fallen into error. There is nothing in the record to support this statement.

As shown in the petition upon which the court granted us leave to appear, the interest of these *amici curiae* is primarily a navigation interest. Therefore, primarily a matter concerning which the Secretary of War is di-

rectly empowered and authorized to act. It is difficult to understand the doubt expressed in the above statement as to the right of the Secretary to consider the interests of the Mississippi states.

We do not believe that a fair consideration of the facts justify calling these interests remote. The water transportation from Chicago to the Gulf of Mexico by way of appellant's canal to the Illinois River and the Mississippi River, affords one continuous water route. The geographical distance of the State of Louisiana for instance, from the port of Chicago, does not, we submit, affect the question. Consideration of a single unit of water transportation was necessarily involved. That these rights and this interest should have been heard and duly considered if any broad, statesmanlike handling of this problem is to be reached, cannot be disputed.

The very fact that the court expressed doubt as to the authority of the Secretary of War to give consideration to these matters demonstrates, we believe, that any proper construction of Section 10 cannot be held to confer the type of authority exercised by the Secretary of War in this case.

Conclusion.

In conclusion we would respectfully urge that the court glance at the index to the printed transcript of the oral argument, filed as an appendix to the petition for rehearing of appellant in this case, which shows the questions asked by the court during the oral argument. In the three hours or 180 minutes of time allotted to counsel for appellant and these *amici curiae*, there were 219 questions asked from the bench. Any fair consideration of this transcript of the oral argument will show,

we submit, that the case could not have been adequately presented in the time allowed. And furthermore it is clear that counsel for the United States made several statements in their argument obviously prejudicial to our side of the question, not supported by the record, to which appellant had no opportunity whatever to reply.

The importance of this case and the broad departure from principles heretofore accepted as settled, alone would justify this petition.

We respectfully urge, therefore, that further opportunity to more fully present the important questions, many of which have obviously not been adequately spread before the court should be allowed.

Respectfully submitted,

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